APR. 11 1958

PETROLEUM WEEK

A McGRAW-HILL PUBLICATION

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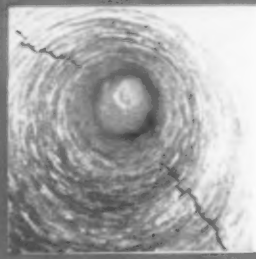
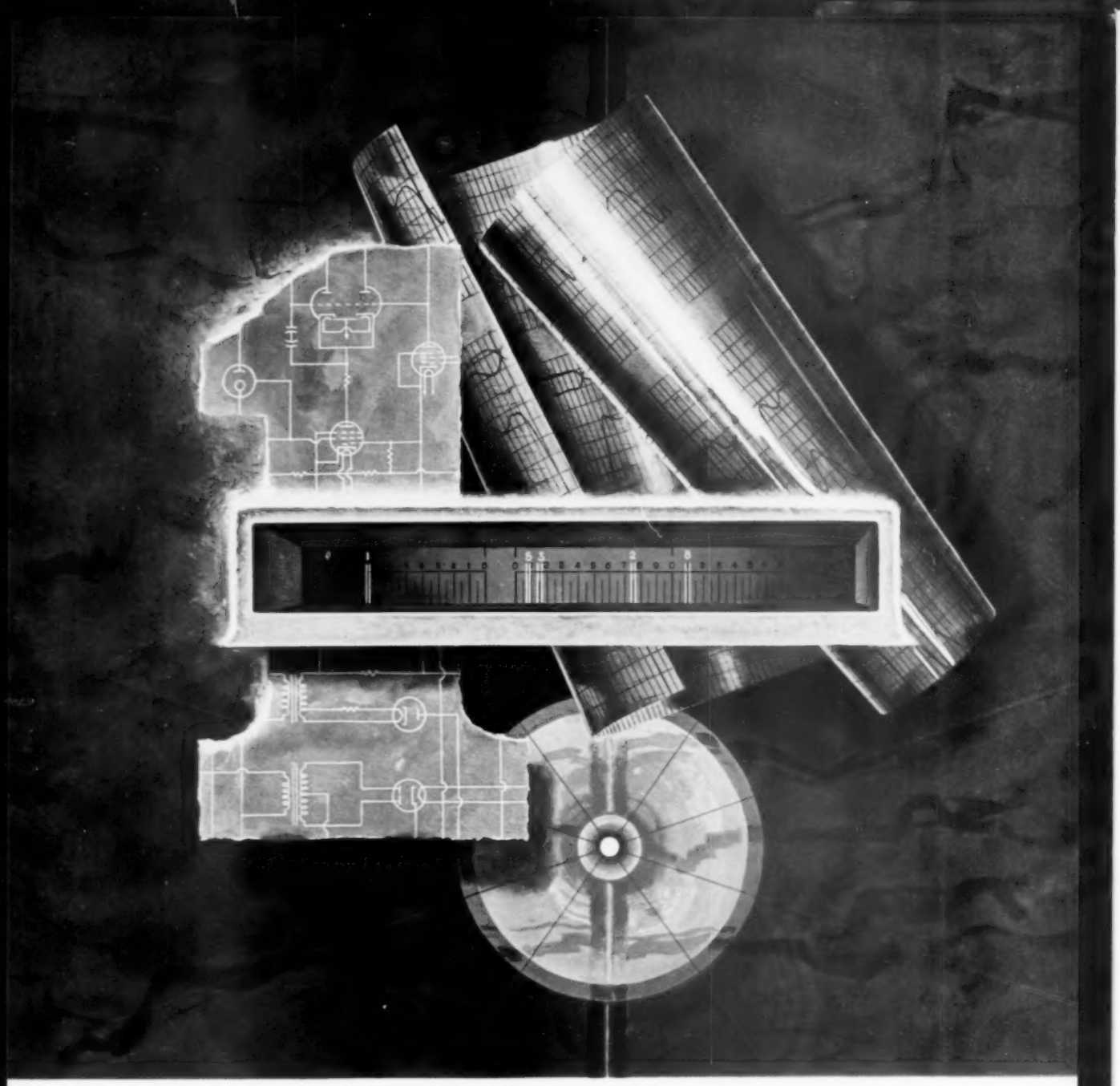


Progress is being made in downhole photography. It may prove valuable in showing fracturing results 11

Price 50 Cents



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report on a mid-continent gasoline plant...

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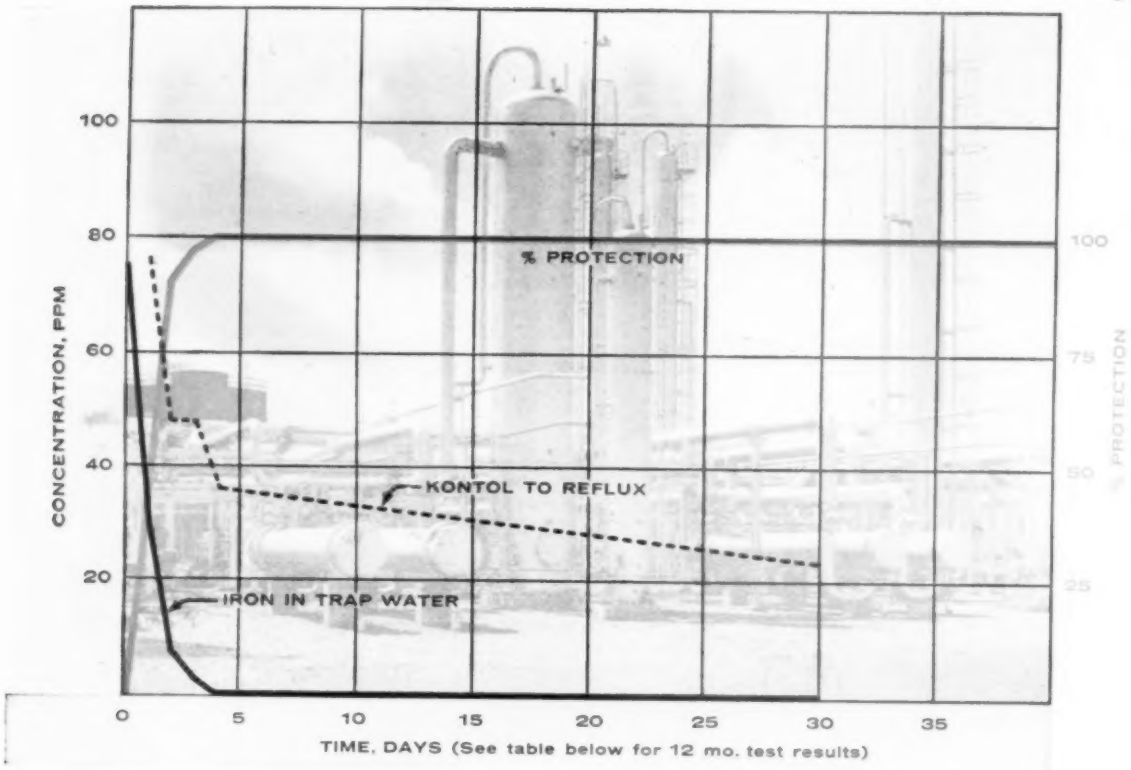

Severe corrosion of the trays and walls of the stills were noted in a mid-continent gasoline plant's absorber. The still was fed with 432,000 gpd absorber oil and 130,000 gpd gasoline reflux. Iron contents of water taken from the tray traps prior to treatment were found to average 75 ppm and the water had a rich red color due to iron oxide products.

KONTOL was injected in the gasoline reflux line by a high pressure proportioning pump. Following is the corrosion survey record for the still:

Test Period (Days)	Iron (PPM)	KONTOL Injected / Day (Gals.)	KONTOL in Reflux (PPM)
Prior to treatment	75	None	—
1	30	11.5	77
1	7	7	46
1	3	7	46
14	0	4.8	32
30	0	3.5	23
30	0	1.6	10
30	0	1.9	12
30	0	.9	6
60	0	.9	6
30	0	1.2	9
30	0	.8	7
30	0	1.0	7
30	0	.8	6

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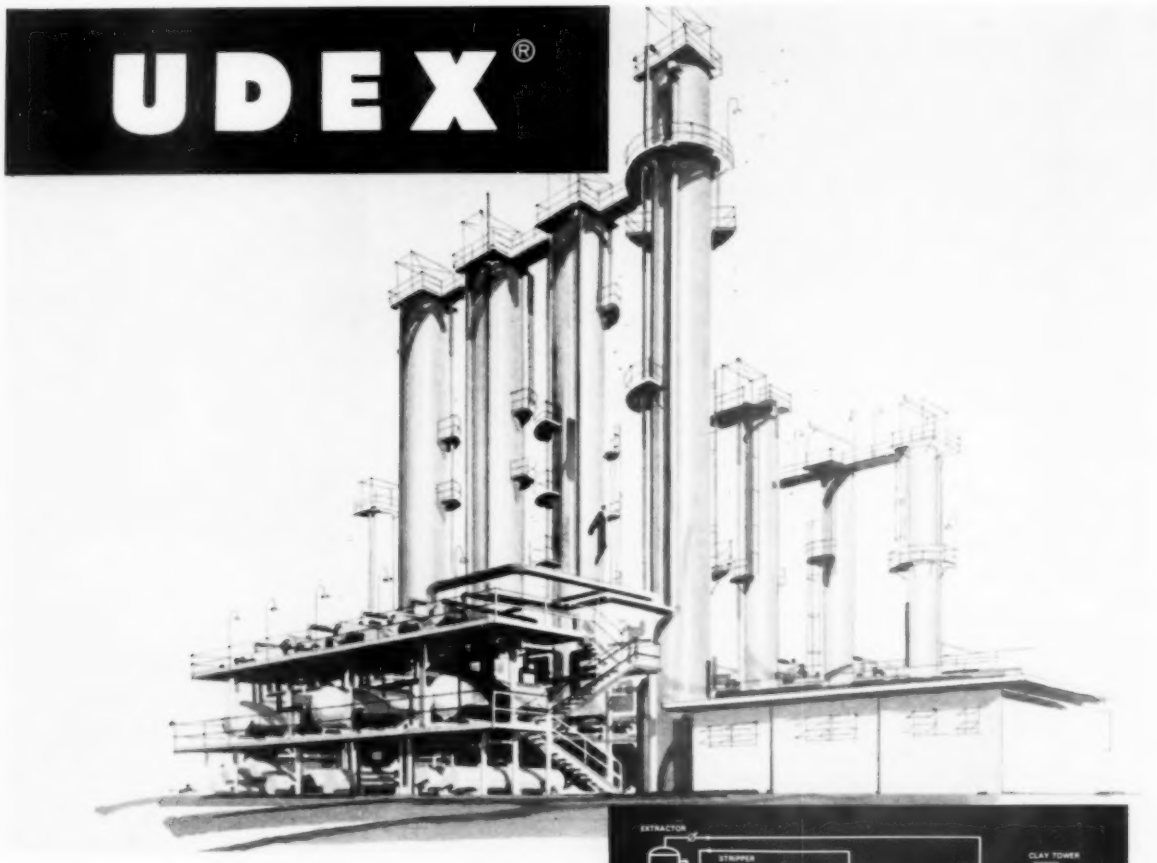

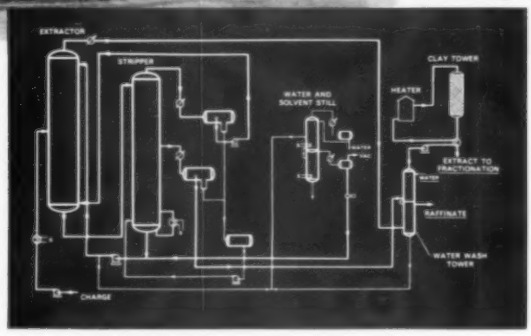

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60-Second Summary

WHAT'S HAPPENING IN OIL

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April 11, 1958

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The Federal Power Commission appears to be shifting its approach to gas pricing. Two recent actions indicate it plans to accept most initial rates and to avoid a "utility" rate base concept as far as possible . . . p 12

•

Texas may hit a production peak in 1962, then decline gradually. That's assuming the state had only 60-billion bbl. of crude to start with. However, new recovery methods may be developed to postpone a downward curve. . . . p. 16

•

Electronics may play a role in cutting drilling costs. A Texas firm has been using electronic instruments in its research and testing of mud pumps. The purpose: to find exactly how a pump behaves so that it can be improved. . . . p. 26

•

Natural gasoline isn't fading out of the picture. True, its use as a blending compound fell off during the octane race, but that may change. If not, stocks can be upgraded and other uses developed. A Special Report details some possibilities. . . . p. 41

•

The French are pretty excited over French oil prospects. The progress they've made has whetted their appetites for more. And Sahara looms large, too. . . . p. 14

•

Nine oil firms now offer group insurance to independent marketers. A survey shows that six plans offer both life insurance and sickness protection. The big benefit to suppliers: better marketing manpower. . . . p. 66

•

Some pipeliners are showing renewed interest in radioisotopes, particularly in operating remote pumping stations, in leak detection, and in research. . . . p. 59

•

A camera for downhole use may prove highly valuable. It takes "before" and "after" pictures of fractures and provides other useful information. However, it still has limitations. . . . p. 11

•

Iran Oil Co. wants to find out the score on the Qum field. It started big, with a spectacular strike in 1955. But later drilling has not confirmed the initial promise. Now another test has been spudded in an effort to firmly establish the potential of the area. . . . p. 54

•

The white man and the Indian are having trouble again. Some oil firms are unhappy over the action of the Navajos in rejecting certain bids on Utah acreage. . . . p. 24

Up to the Minute / SIGNIFICANT LATE NEWS

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April 11, 1958

A severance pay of two weeks' salary for each year of service is being proposed by OCAW. In addition, the oil union wants 10% added for each year of age over 40. Thus, a man of 40 making $100 a week would get $2,000 if he had worked for a firm 10 years, while a man of 50 with the same length of service would get $4,000.

OCAW obviously is going to stress severance pay in its bargaining this year. It says it hasn't in the past because layoffs were mostly seasonal and chiefly affected temporary employees. Now, the union says, veteran employees are being laid off. This creates a real hardship for the man who is "too old to get a new job and too young for a pension."

•

Six bids were submitted last week to meet the Mar. 31 deadline for offshore oil rights in Iran's District 1, at the head of the Persian Gulf (PW—Feb.21'58,p104). While names of bidders were not released immediately, they are known to include such international companies as Socony Mobil, Jersey Standard, and Royal Dutch Shell. At the same time, Conoco, Cities Service, and Gulf last week filed charters of incorporation in Delaware for Iranian operating units.

•

The "Canada first" trend has received some new impetus. A special commission on Canada's economic prospects has just issued a report that has this tone. It suggests that the Canadian government apply pressure to make sure that foreign investments in resources and manufacturing are related to Canadian interests. In oil, for instance, it wants outside companies operating there to press for new markets rather than simply adding to their reserves while currently using crude from other sources.

A national energy commission would be established to advise on oil and gas export policies and prices. Also some tax law changes to benefit Canadians are recommended, including more depletion provisions for Canadian producers.

Some of the proposals are apt to get further backing when another group, the Borden Commission, makes its recommendations on a gas export policy.

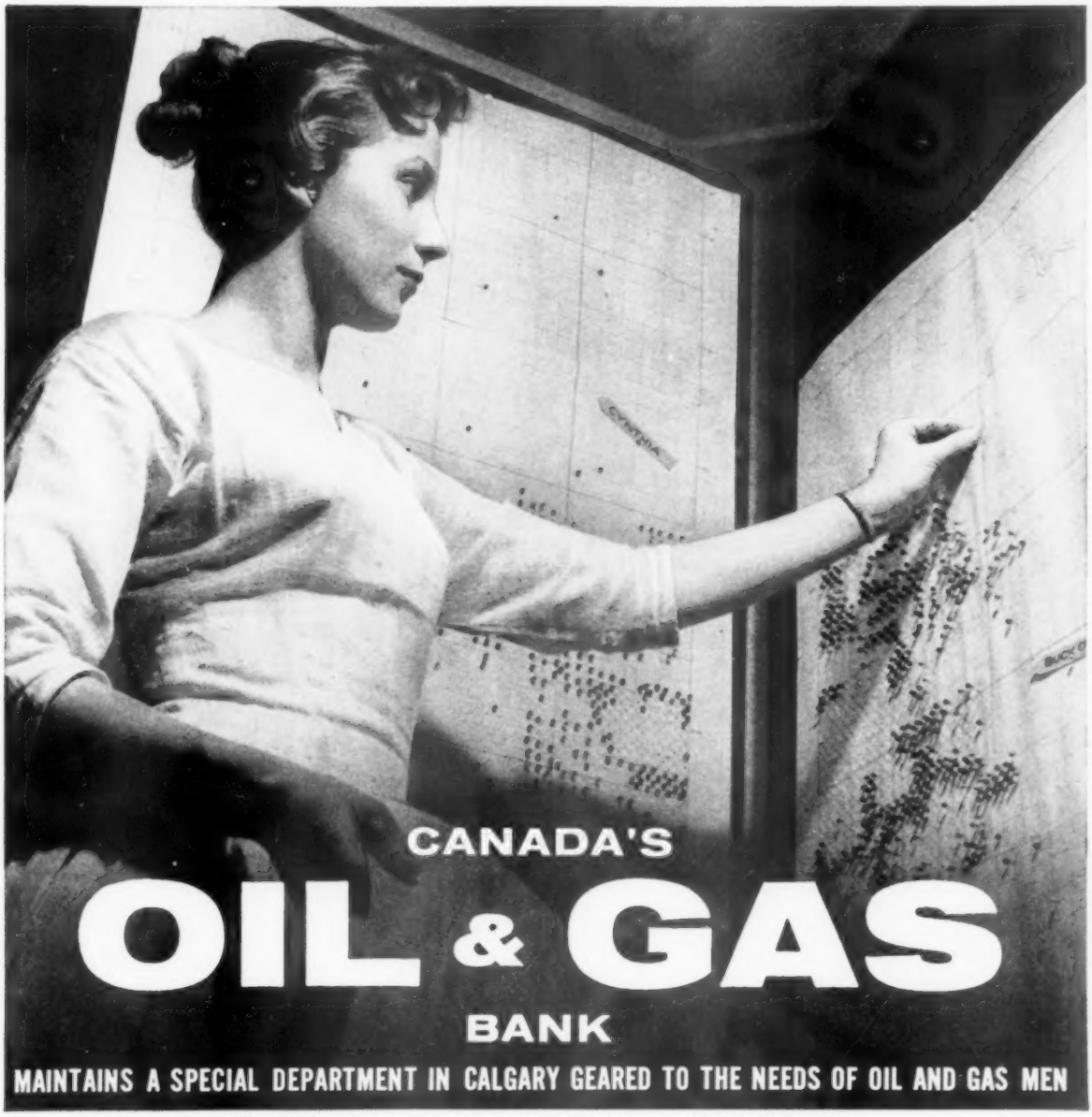
•

FPC will try to speed up its gas certification procedure to help stimulate employment. The agency figures that if some short-cuts can be worked out, the backlog of independent gas producer applications might be trimmed, and production boosted. A general review is already under way.

The move results from requests by Congress and the Administration that government agencies seek new means to help combat unemployment.

•

The government has dropped its price-fixing case against Socony Mobil. A Boston federal district court had already dismissed the indictments, and this week the Supreme Court—at the request of the Justice Dept.—threw out the appeal. Socony had been charged with having illegal retail price-fixing agreements with Boston dealers.



Oil & Gas Department well maps are posted daily to keep pace with changing conditions.

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...to slash rig installation cost

Sink a piece of steel into Lake Maracaibo's corrosive waters, and you won't have much of that steel left after a short time. The high oxygen content of that oil-rich lake chews ferrous metals to pieces.

Which is why the new *aluminum* offshore drilling structures are so important to the oil men working Lake Maracaibo. Developed by J. Ray McDermott, offshore contractor, and Reynolds Metals Company, these tough aluminum templates stand up against corrosion as much as *9 times* longer than steel.

And they save plenty in installation time and costs. The lightweight prefab structures are installed in *two days* by McDermott—compared with as much as 25 days installation time required for the concrete pilings they replace.

The Maracaibo story is just one more in a long list of cost-saving jobs Reynolds Aluminum is doing in the petroleum and chemical processing industry. Reynolds Aluminum is lowering maintenance, installation, replacement and production costs in process pipe, heat exchangers, jacketing, tanks and vessels, drilling rigs, oil country pipe, tubing, structurals.

All-welded for strength

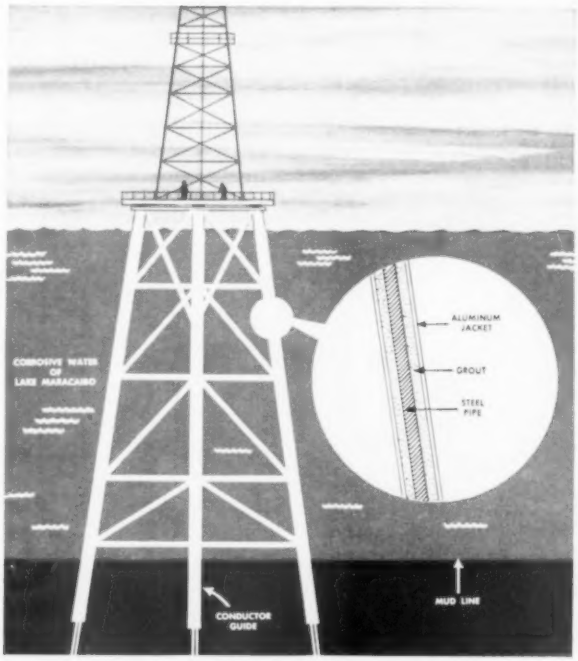
The Reynolds Aluminum jackets for the new Maracaibo drilling platform have welded joints, with special extruded aluminum saddles for added strength and rigidity. These are the largest all-welded aluminum structures ever built.

Conductor pipe: guarded by aluminum

Corrosion—the big obstacle to drilling in Lake Maracaibo—is no problem with the high-strength corrosion-resistant Reynolds Aluminum jackets. Aluminum protects this steel conductor pipe (to contain well casing and drill pipe) from corrosion.

Solves corrosion, relocation problems

This platform design, using tough lightweight Reynolds Aluminum, solves two big problems: Corrosion and installation. Eliminating concrete piling supports, these platforms can be installed in two days—and moved to new locations at great savings.



For details on how Reynolds Aluminum can be put to work for you, and for technical help, call your local Reynolds office, or write direct: Reynolds Metals Company, P. O. Box 1800-CP Louisville 1, Kentucky; International Division, 19 East 47th Street, New York 17, New York.

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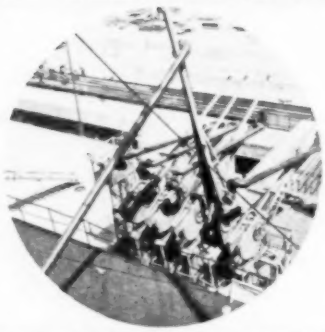

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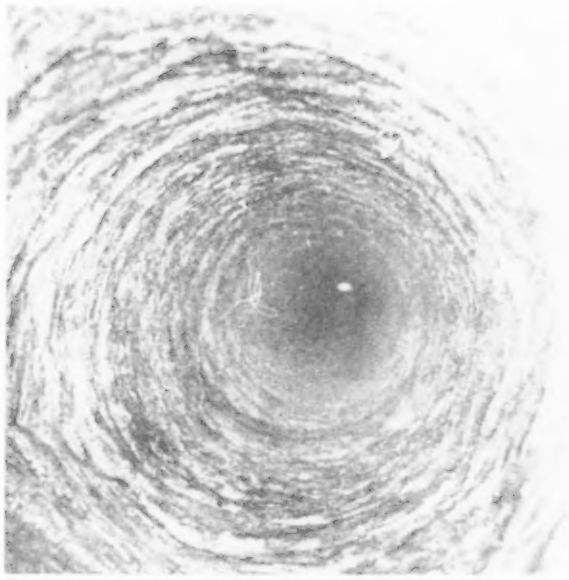
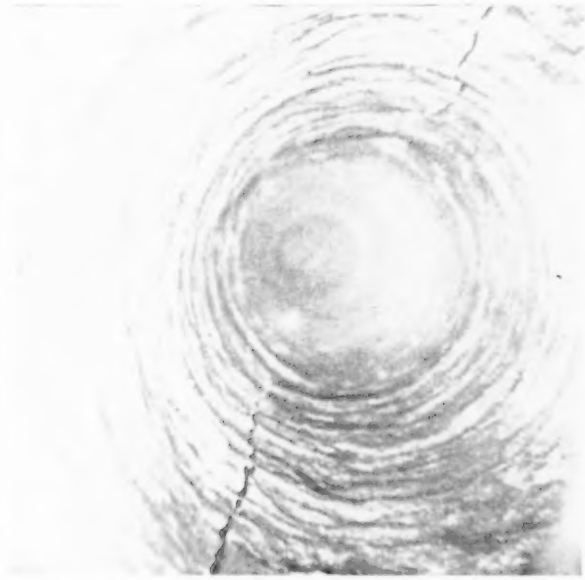
April 11, 1958



BEFORE hydrafrac, gas well bore hole looked like this.



AFTER hydrafrac, two vertical fractures show clearly, as . . .

Camera Takes Downhole Pictures

A specially-built camera that can take pictures of artificial fractures and other conditions thousands of feet down in a well has been developed by a Pennsylvania firm, Birdwell, Inc.

The 16-mm. camera, equipped with a Strobe flash, is 5 ft. long, and has a 4-in. outside diameter. It is lowered into the hole by wire line but is operated by push-button on the surface.

It is capable of taking 600 pictures on one trip.

The camera housing is capable of withstanding wellbore pressures up to 10,000 psi.

Possible deterioration of film, however, limits maximum operating temperature to about 200F.

Many companies have been working to develop such a camera, and some photographs of fish jobs and borehole conditions have been taken.

Considerable work also is under way to adapt television cameras to do the same thing, but performance of such TV cameras hasn't yet been entirely satisfactory in such applications.

So far as is known, the Birdwell camera is the first to film fracture jobs successfully.

Pictures taken in a Medina sand well in the Appalachian area show clearly the vertical fractures resulting from a hydrafrac job.

The photographs were taken from the bottom of casing to the bottom of the hole, at an interval of every 6 in. down the hole.

The pictures were taken after Halliburton Oil Well Cementing Co. had used 4,000 gal. of water gel and 8,000 lb. of sand and radioactive beads (about 1 qt., containing about 10,000 beads) in the frac operation.

There was a 72-day lapse between the frac job and the time the pictures were taken. This delay was made so that all of the frac fluid could blow out of the well to assure a dry hole for the "after" pictures.

At the end of this period, however, some water vapor was still being carried in the gas. So the camera was introduced into the well through a lubricator and the pictures taken under about 400 psi. pressure.

Pictures have also been taken in other Appalachian and Mid-Continent wells, some to depths of 6,300 ft. But there were no pictures taken of artificial fractures in these wells.

The pictures may help settle a long-standing question: Are fractures vertical, or horizontal?

One engineer of a fracturing service company believes the Birdwell camera will not be able to give a definite answer to this question, despite the photographic evidence from the Appalachian well.

This is so, the engineer says, because each formation reacts differently to a frac process.

Birdwell, a Bradford (Pa.) company, will attempt to resolve this question by taking pictures of another well that will be fractured with frac initiators—jet charges that attempt horizontal fractures.

The company's tracer log evidence indicates, however, that such fractures may be either way, though as many as 95% may be vertical. A Birdwell engineer says there are instances, particularly in shallower wells, in which horizontal fractures are indicated.

Another potentially important use of the Birdwell camera: Proving the effectiveness of radioactive tracers.

The radioactive tracers used in the Halliburton frac operation showed the depth and vertical extent of the fractures. The subsequent photographs tended to confirm the Birdwell frac tracer survey, opening up the possibility of increased use of such tracers for fracturing jobs.

A Birdwell engineer reported that

the pictures also showed the presence of shale, and that it did fracture.

Up to now, it has been believed by many oil men that shale would not fracture.

The pictures showed that a portion of the fracture in the shale appears to be completely closed. This would not show up on a radioactive tracer survey.

It was the presence of shale in this well that was partially responsible for its selection for the test.

So far, the Birdwell pictures have been taken only in dry well bores.

Some pictures have been taken in clear water in the laboratory, but there have been no field tests.

Nor can the camera take pictures in a borehole that is filled with an opaque fluid—such as drilling fluids or formation oil.

The Birdwell camera may be used for such jobs as locating underground caverns, for storage possibilities, and other wide uses.

An area study of fracture patterns may show that fractures follow in a certain direction, leading to possibly better placement of wells.

FPC Eases Price Views

The Federal Power Commission appears to be steering away from a "utility" pricing method for natural gas and from attaching price conditions to initial certificate applications.

Because of some court decisions, FPC's position on whether to use a rate base (or "utility") approach in independent producer rate cases has been cloudy.

And the commission's own contradictory actions in sometimes tacking on price conditions in producer certification cases has been equally puzzling.

But last week these matters got a thorough airing in two separate FPC decisions, and, although there remained some hazy spots, the commission went far toward making its views known.

In one case, FPC has rebutted its staff and said certificate cases were no place to consider rate level matters.

The case involved two producers seeking certificates to sell gas from a Louisiana field to United Gas Pipeline Co. for 19.5¢ per Mcf. An examiner approved, but the FPC staff wanted a condition cutting the initial price to 18¢.

The commission then voted, 4-1, in favor of the certificate and the higher price for Seaboard Oil Co. of Dallas and Charles B. Wrightsman of Houston.

The commission acknowledged that it had in the past attached a price condition. It did so in the Signal case some time ago.

But in the Seaboard case, the commission said, gas in the area had sold as high as 20¢ as far back as 1952. The 19.5¢ price wouldn't set an area high. Nor would it affect other prices on the Louisiana Gulf Coast.

And although the staff had sought to shift the burden-of-proof argument to the producers, the commission disagreed.

Rates usually should be left to rate cases, the commission said. And besides, it added, the commission's docket is far too crowded to consider rates in certificate cases.

The commission cautioned that, in some exceptional cases, rates still might be considered in certification cases if the price is believed too far out of line.

FPC also revised its thinking on field pricing of gas and repudiated the rate base idea.

Gas industry representatives believe the commission's decision in the Pan American Petroleum Corp. case will extend to most independent producer rate cases.

Pan American, Sohio, Continental, Skelly, Gulf, Atlantic and five other producers sell the residue of casinghead gas to Cities Service Gas Co. from their West Edmond field in Oklahoma.

By contract, the producers were to get a price increase from 7.5¢ per Mcf to 8.5¢ in 1955. When they filed for approval of the change, FPC suspended the higher rate, which later became effective under a refund commitment.

Even though a court decision in the City of Detroit case seems to require FPC to use the rate base method in determining price increases, FPC overruled the examiner and granted the new price to the producers.

The traditional rate base method cannot be used in many producer rate cases, FPC said—and certainly not in such an involved operation as the Pan American group has.

Oil Man's Album

What's the Right Price for 'Gas'? It Depends

You might keep this picture around to show the next person you hear complaining about the price of today's gasoline. The scene was in 1921. The price of the 'premium' grade was 35.5¢ a gal. Bear in mind that no state or federal taxes were involved. Nor did the octane rating approach 100. And service stations in those days weren't quite so attractive in appearance as today's, either.

(No. 8 in a Petroleum Week Series)

Shale Oil Continues to Be a Big Goal

Oil shale development is still a long-range project, but there has been no let-up in efforts to make it commercially feasible. And progress is being made.

Oversupply of crude and the general economic situation have shown no signs of dampening interest in shale oil.

Two companies—Union Oil Co. of California and Oil Shale Corp.—are active in shale research and development work.

The Texas Co. announced recently that it had bought land at Salt Lake City as a site for a shale oil research laboratory (PW—Mar.28'58,p14).

Several other companies have large oil shale holdings, thus putting them in a position to move quickly if the feasibility of commercial shale oil becomes more apparent.

Union oil recently completed a year of operation at its shale demonstration plant at Grand Valley, Colo., and is continuing with its research program.

Fred L. Hartley, vice-president of Union's research department at Brea, Calif, emphasizes that his company is taking a long-range view in its operations. The present oversupply situation is regarded as a temporary situation that is not critical to long-range development of oil shale.

Hartley points out that Union's program is strictly a research operation, not a marketing operation, hence the immediate presence or absence of markets is not a controlling factor.

Objective for this year include mining shale underground to help confirm mining costs, and carrying on further retort developments.

Oil Shale Corp. is concluding a year of tests at a pilot plant operated by Denver Research Institute in Denver.

One of the prime objectives of the Beverly Hills (Calif.) company's program is the development of equipment to recover oil from shale with the possibility that the company may license users of the process. Work reportedly has been very successful. The project has been under way since late spring of last year.

The problem for companies interested in shale oil remains unchanged: how to make it commercial.

Only cost figures released to date are those put out by Union at the February meeting of the National Western Mining Conference in Denver.

It was reported Union had reached its original objective of retorting for less than $1 per bbl. of oil produced. This was accomplished through the combined effects of the retort's large throughput capacity and simplified mechanical design developed during the past few months.

The new target, according to Hartley, is 50¢ per bbl. of oil.

Most of the shale oil produced to date has been used to carry on further experiments.

Union reports some of its shale oil has been sold under contract in Colorado for use in generating steam.

Union says its experimental program in shale oil refining has been completed "with results indicating all major problem areas have been resolved." Objective was to develop an optimum method for converting raw shale oil into "commercial shale oil" —a partially refined product that could be moved without difficulty through pipelines, blended with crude oils, and sold as a high grade crude oil. It would be superior—in refining value—to many of the country's crudes.

The objective was reached by reduction of shale oil's pour point and then by hydrogenation.

Pour point was reduced from about 90F. to about 30F. in two stages: first, by removal of "light ends" by distillation; then by coking of the heavier material, which was done in Union's pilot plant coker at the Research Center in Brea.

The second major step was hydrogenation, the bringing together of coked shale oil and hydrogen at high temperatures and pressures in the presence of a catalyst. Union found that nitrogen could be most effectively removed as ammonia, then made available for fertilizers.

End products obtainable from shale oil include gasoline, diesel fuel, jet fuel and kerosene.

Union says shale-derived jet and diesel fuels meet all known military, as well as commercial, aviation specifications. The company recently shipped barrel-quantity samples of military specification PJ-4 jet fuel and marine diesel fuel to the Navy for evaluation, including engine testing.

It was found that conventional processes of catalytic cracking and catalytic reforming can be employed to convert a large percentage of the shale oil barrel into 100-plus octane gasoline.

Byproducts include such things as electrode-grade coke within the range of all aluminum industry specifications, sulfur, wax, and ammonium sulfate.

A year's operation at Grand Valley proved Union's concept of a "rock pump" entirely feasible, Hartley reported.

A large ram-like piston serves as a "rock pump," feeding crushed shale upward from the bottom of the retort. As shale is pumped upward, it is contacted by hot gases pulled down past the rock by blowers. Hot gases result from the burning of residual carbon in the oil shale ash at the top of the retort. Recovered oil and combustible gas are withdrawn from the bottom of the retort.

Gas produced from the retorting process is said to burn well and also is not a source of atmospheric pollutants.

The combustible gas could produce something of the order of two million Btu's per ton of shale, Hartley reports, or about one-half as many Btu's as are contained in the oil.

Possible uses for the gas would be to produce process steam or process heat for the refining step, or to make steam for the generation of electricity to power operations and augment the local power system.

Continuous automatic runs of up to six weeks have been achieved at the Union retort.

The retort was put into operation during March, 1957, and reached its design rate of 360 tons per day by early summer. It has been improved from that rate to the recently announced 550 tons per day without changing its yield rate.

The company says rock throughput has been attained in excess of 900 tons per day, on automatic operation, without significant changes in the yield.

Congressional committees are considering a move to have the present oil and gas tax depletion allowances applied in an equivalent manner to shale oil.

Under the current setup, a maximum of 15% is the maximum allowed for mining. An effort is being made to up the percentage to correspond with that for oil.

France Has All The Symptoms of A

Although counting heavily on future supplies of Sahara crude, France is doggedly pushing the search for oil at home. And with a big boost expected in demand, refining capacity is slated to near 900,000 b/d by 1962.

This year, some 100,000 visitors are expected to turn up at the Parentis oil field—France's leading tourist attraction in the southwest.

The oil field, France's biggest, is listed in French guidebooks along with other regional musts, such as prehistoric caves and famous vineyards.

This pilgrimage to Parentis is typical of the oil fever sweeping France—a fever fired by spectacular discoveries in the Sahara.

Oil is a major topic of conversation wherever Frenchmen gather. Ever since the rich Parentis strike in 1954 touched off the current Gallic oil boom, seismic gangs have been wandering all over the map of France. They have turned up among the dusty Roman ruins of Provence, searched around the famous vineyards of Burgundy, annoyed Norman farmers, and combed the hop fields of Alsace.

When Parentis was followed by development of a major gas field at Lacq—and the Sahara finds—French oil fever flared. Now, news of the first potentially commercial oil find in the Paris Basin (PW—Mar.7'58,p68) is pitching the fever even higher.

The Sahara discoveries are France's big hope for the future. With domestic production a scant 28,300 b/d, France is counting heavily on the Sahara to lessen reliance on crude imported from the Middle East. The French government's target is for some 200,000 b/d of Sahara crude in 1960.

A new refining center to process Sahara crude has already been projected for northeastern France.

Both Shell and a French group are planning 60,000 b/d plants for the Strasbourg area. And another French group is planning a 60,000 to 80,000 b/d refinery for Dijon, in Burgundy.

A 22-in. pipeline, stretching 435 mi. from the Mediterranean to the new center, is under consideration.

The new refineries will help France hang on to its position as one of Europe's top refiners, boosting capacity to over 870,000 b/d by 1962.

At present, France's 13 refineries have a combined capacity of over 621,000 b/d.

In addition to the new refineries going up in the northeast, Esso is building a new 35,000 b/d plant at Bordeaux, in the southwest. Some extensions to existing facilities are also planned.

This expanded capacity will leave a margin for export, with the European Common Market area a prime target for exports from the new center. Member nations of the Market are France, Italy, West Germany, and the Benelux countries.

Exports of products now go mainly to French overseas territories—or former territories. Total exports last year were about 90,900 b/d.

Of the present seven refiners, three are American. Socony has 43,000 b/d capacity; Esso, 85,000 b/d; and Caltex, 25,000 b/d.

Other refiners are British Petroleum with two plants, Shell with three, and two French groups—Cie. Francaise de Raffinage and Antar-Petroles de l'Atlantique—each with two.

Because of sharp increases in industrial production, energy requirements are zooming. They're up over 60% since 1952.

Petroleum now fills about a quarter of France's energy needs. And it is expected to jump an additional 5% by 1961. Gas consumption is expected to soar. Coal, on the other hand, is expected to decline percentagewise, and atomic energy is expected to be negligible before 1965.

Although French oil demand stagnated last year, oil companies expect it to jump 50%, to 580,000 b/d, by 1961, and to roughly 730,000 b/d by 1967.

Last year, in the aftermath of the Suez crisis, demand dropped 2% from 1956 levels, to approximately 385,840 b/d.

No dramatic shifts are foreseen in France's demand pattern. By 1965, inland consumption for metropolitan France is expected to look like this: (with 1957 figures in parentheses): gasoline 61-million bbl. (38-million bbl.); turbofuel 3.2-million bbl. (540,000 bbl.); middle distillates 58-million bbl. (27.7-million bbl.); and heavy fuel oil 84-million bbl. (46-million bbl.).

Despite a dogged push in exploration activity, domestic production climbed to only 28,300 b/d last year, up 12% from the year before. The boost was due mainly to increased output from the Parentis field during the Suez trouble.

A total of over 1.6-million ft. of hole was drilled in 1957 in France and its territories, compared with 1.1-million the year before.

Natural gas production, however, leaped 64% in 1957 over 1956 to a total of over 2.3-million cu. ft.

Exploration costs in 1958 are expected to jump $43-million over last year's $148-million total.

According to the Bureau de Recherches de Petrole, total investments for exploration, production, and overhead costs, will reach about $410-million, compared to last year's $270-million.

There are now five U.S. companies exploring in France. Besides Esso, they include Caltex, Socony, D. D. Feldman, and Rimrock Tidelands.

In all, there are twenty companies involved in the search, holding a total of 77 exploration permits.

European companies exploring in France are Shell, British Petroleum, and to a small degree, Petrofina—all through French affiliates.

Any U.S. company interested in the French oil hunt must find itself a French partner.

After Esso made the initial strike at Parentis—in an area no other company wanted—the French government decided that no company controlled by foreign interests would get an exploration permit.

Esso was obliged to form an exploration subsidiary, Essorep, for Parentis, in which the government holds a 10% interest through its Bureau de Recherches de Petrole. Another 1% is held by Finarep.

All subsequent permits to foreign companies were granted on the condition that they either form new companies with controlling French interest, or join a French company in a joint venture.

An Oil Fever

Although private French and foreign companies now make a big contribution to the oil hunt, the government has by no means stepped out of the picture.

BRP holds an interest in most French oil companies, and controls several of the leading ones.

In addition, the Regie Autonome des Petroles, a government-owned company, holds seven exploration permits plus the production concession for the St. Marcet gas field, in the southwest.

Through the French Treasury, the government also owns 35% of Cie. Francaise des Petroles, France's only international operator, and controls 40% of the voting rights.

The government is counting on the current search to help it replace imported oil, a major cause of the chronic French trade deficit.

During 1957, crude imports—because of the Suez crisis—sagged to 481,240 b/d, from 500,260 b/d in 1956. Over 78% came from the Middle East, dropping from 91% in 1956.

Imports of products more than doubled in 1957, to 54,880 b/d.

In normal 1956, untroubled by the Suez crisis, 25,760 b/d of products were imported, in this pattern: 25% from the U.S., 15% from Venezuela, 14% from Rumania, and 11% from the Middle East. Leading the list of imports were heavy fuel oil, gasoline, and gas oil.

France's international operator, CFP, plays a major role in imports through its producing interests in Iraq, Iran, and Qatar.

Foreign-owned refining companies—including U.S. firms—hold 51% of France's market. Esso alone accounts for 15% of total marketing, and 20% of white-product sales.

About three-quarters of oil marketing is handled by the seven refiners; the rest by distribution companies.

Port facilities are being enlarged to handle giant tankers. Le Havre is now being expanded, and Lavera, an oil port on the Mediterranean near Marseille, and Brest, at the northwestern tip of France, will also be equipped to take supertankers in the next few years.

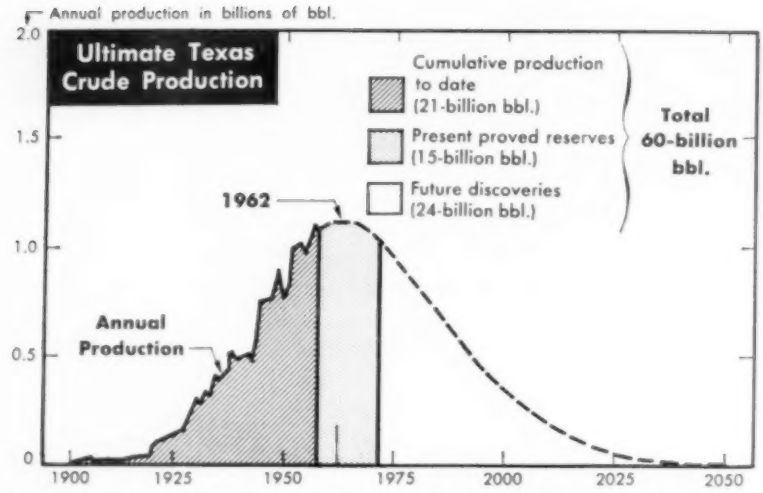
Pipeline facilities are also being boosted. There are now 2,718 mi. of oil and natural gas lines in France, plus some 1,800 mi. of military lines.

By mid-1959, a further 750 mi. of gas pipeline will run from Lacq.

ENTHUSIASTIC FRENCH INVESTORS have oversubscribed every recent issue of oil stocks. Some 2,000 are waiting here to buy 480,000 shares of Generep, at $28 a share.

EVEN THE GROUNDS around the Chateau of Chambord, built as a hunting lodge by Francois I, are hopefully scoured by a seismic crew working for a Franco-American firm.

SAHARA crude is now trickling through this temporary 6-in. line on its way to France.



A DECLINE in Texas' production potential isn't far off, one expert says, if an original potential of 60-billion bbl. is assumed. However, he points out that recovery methods yet to be developed could slow the decline appreciably.

Is Texas Slowing Down?

An oil geologist sees these dates as the peaks in the Texas oil picture: rate of discovery, 1949: proved reserves, 1955-1956: production, 1962.

Texas apparently has already passed its high point for new discoveries and the addition of new reserves, and should hit its crude production peak about 1962, according to M. King Hubbert, Shell Oil Co.

Hubbert, a geologist with Shell Development Co.'s exploration and production research division, Houston, presented the estimates this week at a University of Texas conference on state resources.

He placed the original total of oil in place in Texas (extractable by present methods) at approximately 60-million bbl. and the total of natural gas at about 350-trillion cu. ft.

Hubbert noted that Texas now is producing approximately 1.1-billion bbl. of oil annually, about 5.2-trillion cu. ft. of natural gas, and about 165-million bbl. of natural gas liquids and liquid petroleum gases.

Using mathematical calculations, Hubbert found that "the discovery curve is an approximate preview of the production curve."

And, "the peak reserves should be reached about midway between the time of the peak of the rate of discovery and that of production."

Hubbert's calculations show that the state's rate of discovery reached its maximum height "about 1949."

Between 1938 and 1947, he added, there was a "nearly constant value" of about 12.7 years between the discovery rate and the production rate.

Using this relationship, he said, the curve "indicates unequivocally that the peak of the rate of discovery occurred about 1949."

This means, he added, that Texas' proved reserves attained their peak "about 1955-1956."

Hubbert said the date halfway between the peak of the rates-of-discovery curve and that of the rate-of-production curve represents the peak of the proved-reserves curve and puts it around 1955-1956.

"Only an abnormally high rate of discovery, or else a reduced rate of production for the next few years, could cause the curve of proved reserves to renew its ascent," Hubbert asserted.

Hubbert said improved recovery processes might prolong the oil production rate, however.

"It appears highly probable that improvements in recovery processes in the future will make it possible to extract considerably more oil than that indicated," he said.

"The effect of this would be to decrease the rate of decline and possibly even to reverse it temporarily."

Texas' gas production should peak at "about 6.1-trillion cu. ft. per year" around 1970, Hubbert estimated.

New Road Bill Has Sign Limits

A pump-priming highway bill (HR 9821) was on President Eisenhower's desk this week awaiting his signature. It would put around $700-million into added highway construction in fiscal 1959, beginning July 1.

The bill that cleared Congress shortly before adjournment for Easter recess provided additional funds both for the 41,000-mile interstate system and for the politically important primary, secondary and urban roads.

All told, the bill would make available for new highway construction $3-billion through fiscal 1961.

Most controversial feature of the bill was Section 12, pertaining to the regulation of billboards along the interstate system. In the Senate Public Works Committee, the antibillboard group led by Sens. Richard Neuberger (D., Ore.) and Thomas Kuckel (R., Calif.) succeeded in writing relatively tough provisions that, among other things, would prohibit commercial signs larger than 500 sq. in. along the rural stretches of the new interstate roads.

However, a Senate amendment offered by Sen. Francis Case (R., S.C.) knocked out the size limitation. The effect of his amendment would permit any size sign along the 600-ft. wide strip adjoining the edge of the highway right-of-way as long as it advertised an activity located within 12 miles of the sign. Senator Case says the purpose of the amendment was to give towns and communities by-passed by the new roads an opportunity to advertise their activities. The restrictions are still subject to interpretation.

The way the law now reads, it may be possible to advertise motels, gasoline, oil, cigarettes, and other nationally known brand items, as long as they are tied in on the sign with an activity within 12 miles. This is certain to provide a problem for Secretary of Commerce Weeks in promulgating the standards for regulating the billboards along the interstate system.

Another provision substantially eliminates signs in commercial and industrial areas in municipalities from regulation.

Some states will have tougher billboard regulations than the federal law would require. Maryland and Oregon have enacted such laws.

However, to qualify for a special federal bonus of one-half of 1%, a state need only have a law equal to the federal requirements.

What's New / IN THE INDUSTRY

Agreement Reached in Hughes Tool Antitrust Case

An antitrust suit against Hughes Tool Co. has been settled. The government had charged that Hughes had entered into restrictive agreements with several German drilling equipment manufacturers relating to prices, sales territories, and to imports and exports. Hughes said it felt that the only effect of these agreements had been to help promote U.S. foreign trade.

But, rather than go through lengthy litigation, the firm agreed to a consent settlement under which it will discontinue such arrangements.

•

Standard Oil Co. (N. J.) paid five times more to governments last year than in dividend payments to its stockholders. The payments for taxes, duties, etc., were over $2.3-billion—amounting to $11.66 a share.

Jersey Standard's consolidated earnings for 1957 were $805-million. The year before, they were $809-million. Revenue from sales and investments were 10% over that for 1956.

•

A liquid chemical has been developed to remove corrosive and fouling agents from crude. The product—Cronox Conditioner—is mixed with soda ash and water and is fed into a refinery's crude charge continuously. The developing firm: the Aquaness Dept. of Atlas Powder Co.

•

It's unlikely that the Midwest will get additional gas supplies in time for the next heating season. The Federal Power Commission says it now appears improbable that it can rule by Apr. 15 on a recently-worked-out compromise plan for new gas transmission into the area. Midwestern Gas Transmission Co. had said it needed a decision by mid-April in order to have new facilities in operation by next January (PW—Mar.28'58,p.61). FPC last week gave interested parties 10 days in which to comment on the Midwestern proposal.

•

The stage is set for a decision in Alberta on two plans to export natural gas to California. The Alberta Oil & Gas Conservation Board has concluded hearings on rival applications by West Coast Transmission Co. and Alberta & Southern Gas Co., a subsidiary of Pacific Gas & Electric. During the hearings, Trans-Canada Pipe Lines Ltd. sought assurances that neither project would threaten the adequacy of reserves to meet its own long-range needs.

•

An effort is being made in Congress to lower the price of the Navy's Elk Hills crude. Three independent refiners last year bid an average of 12.25¢ a bbl. over the posted price. Now, they say, that price is too high because of current market conditions. Two senators have introduced legislation to permit the companies—Mohawk Petroleum, Rothschild Oil, and Douglas Oil—to cancel the contract or to drop the 12.25¢ premium.

•

A probe into Federal Power Commission activities may get under way shortly. A congressional group investigating practices of regulatory agencies already has its staff checking on FPC, and hearing dates probably will be announced shortly after Congress gets back from its Easter recess.

•

Four vice-presidents of Standard Oil Co. (N. J.) have been made executive vice-presidents. They are Hines H. Baker, L. W. Elliott, E. E. Soubry, and Leo D. Welch. Welch was also added to the executive committee, of which the other three are also members.

INSIDE *Slant*

A NEW PENALTY FOR CRUDE?

Some refiners are planning a new type of price penalty to apply to crude. It is just one more step to bring the prices paid for some crudes in line with their true refining value.

The newest penalty will hit oils with "excessive" vapor pressure.

Anderson-Prichard recently stopped buying oil with a vapor pressure exceeding 12½ psi. Now some refiners say they may penalize crudes when vapor pressures exceed 7 psi.—when the increase in vapor pressure is due to sellers adding lighter ends from field processing plants to the crude stream to raise its gravity.

The refiners' problem is twofold: With modern processing techniques, they can make the lighter ends they need—and with a higher octane than light ends from the field. Second, automotive styling and engine design now impose stricter limits on gasoline vapor pressure.

To stop deliberate additions of vapor-pressure—building light ends to raise gravity, a few refiners are thinking of keeping a closer check on crudes bought in the field.

Some also may ask sellers for affidavits on whether light ends have been added, and will assess a penalty based on the increase in gravity due to the addition of the lighter ends.

LeRoy Menzing
EDITOR

Looking Ahead in Washington

McGraw-Hill
Washington
Bureau
April 11, 1958

AT-A-GLANCE
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PETROLEUM WEEK

You should keep a close eye on the House Ways and Means Committee now. That's where the first tip-off will come on chances for mandatory oil import restrictions. Close-door sessions start Monday, and the committee will decide within the next couple of weeks whether to include oil curbs in a new trade bill.

There may be a strategy problem for backers of the oil amendment. The imports control bill of Rep. Frank Ikard (D., Tex.) would help oil producers and the domestic fluorspar industry, and it leaves room for even more protection-seeking groups. But some oil-state congressmen don't like this approach; they think domestic oil should stand alone. Here's their reasoning: A strong free-trade bloc in the committee might make one exception—for oil producers—but will fight any large-scale revision of the current trade policy. So a decision will have to be made on which road to follow, and a miscue here might be fatal.

•

The new highway bill could have a boomerang feature for the oil industry. Legislation passed by Congress speeds up construction of the interstate highway system—but it also requires state governments to hunt quickly for more money to match federal funds. And already there are signs that several states will look to increased gasoline taxes. Gov. Lindsey Almond of Virginia and others are considering such boosts.

•

Watch for increased activity in the Interior Dept.'s Office of Oil and Gas. Although Matthew V. Carson, the new director, also must continue to guide the oil imports program, he has been promised increased office manpower by Secretary Fred Seaton. Among the projects that have been lagging in the oil and gas planning is an over-all emergency plan to be submitted to the office of defense mobilization. Carson will try to hurry action on this and other problems.

•

The government now plans to continue voluntary restrictions on West Coast imports. Carson interprets the recent Cabinet committee report —which left District V imports unchanged—to mean that the West Coast program won't end June 30, the original expiration date. Instead, the program will automatically continue at the present level, holding imports there to 200,000 b/d.

•

Venezuelan representatives in Washington don't see any great hurt in the new import cutbacks. They expect Venezuela to be hit by about half of the 58,000 b/d total reduction, but new importers brought into the program will make up much of the feared market loss.

•

The State Department has taken the position that the increased power of Crown Prince Feisal in Saudi Arabia should not endanger U.S. holdings in Arabia. Officials say they see nothing to indicate that Feisal is as "pro Nasser" as some foreign diplomats fear, or that another Suez crisis could result. They believe Feisal's chief goal is to strengthen the Saudi dynasty by putting the government on a sounder fiscal footing.

PROCESS SIMULATION

What can it do?

In Research Studies—Process Simulation:

- Bridges the gap between empirical data and theoretical expressions.
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PROCESS SIMULATION

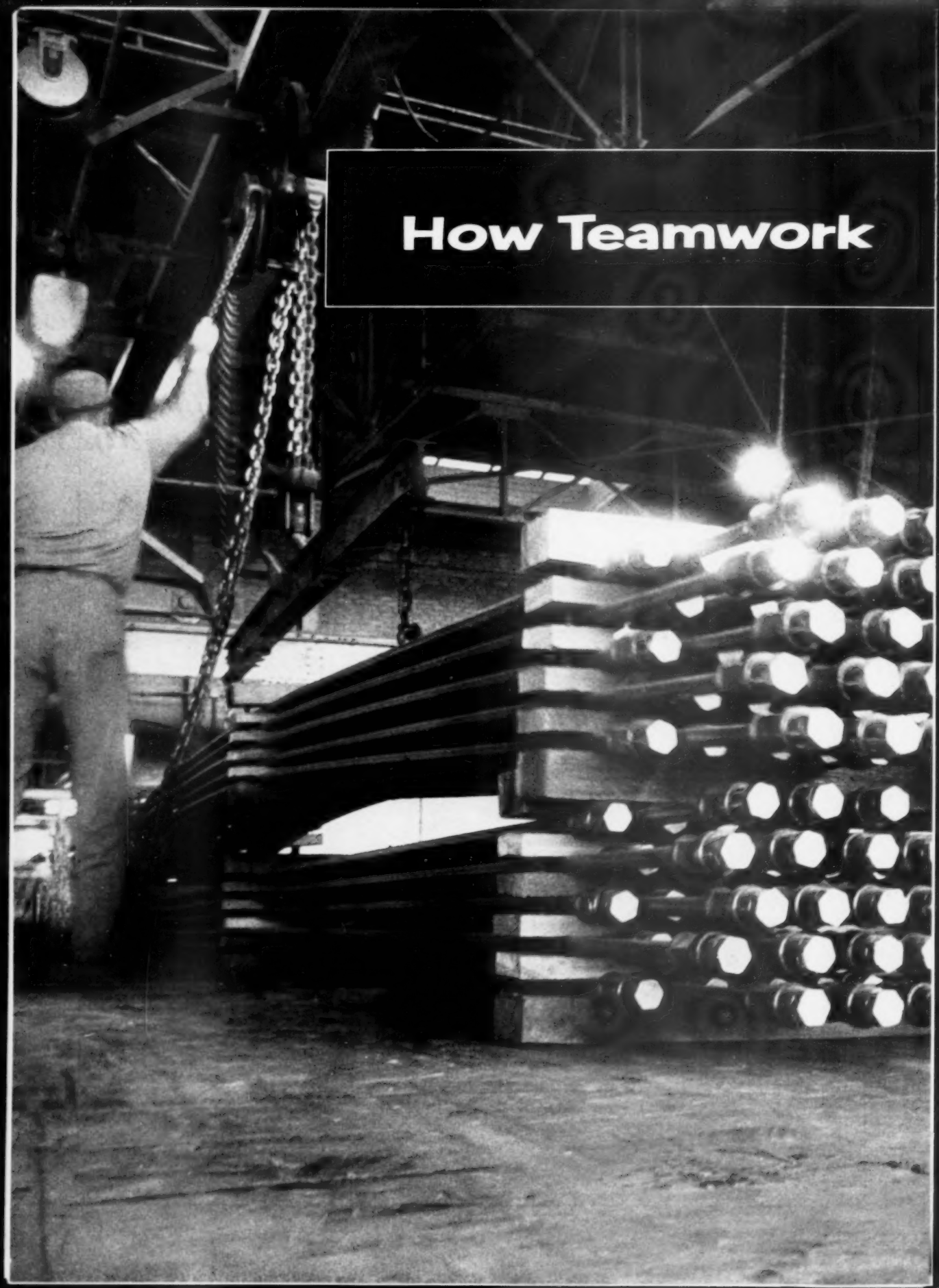
COMES OF AGE

Detailed information can be obtained by mail, wire or telephone :

Electronic Associates, Inc.

Manufacturers of PACE *Precision Analog Computing Equipment*

LONG BRANCH, NEW JERSEY Dept. PW-4



How Teamwork

Improves Rod Service

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"All set"

Each Baker Centralizer Spring is carefully formed with a bowed height that is greater than it should be for its length . . . in accordance with Baker's original Optimum Centralizer Spring Design. The spring is then *pre-set* by being completely flattened in a press and allowed to return to the exact bowed height specified by the Optimum Spring Design. Since this specified bowed height of the springs will not thereafter be materially lessened due to permanent set . . . even when the centralizer passes through tight spots or dog-legs in the hole—the *net effective reach* to center the casing is present when cementing is started. You are *all set* for best results.

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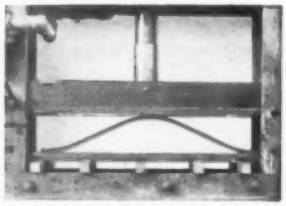
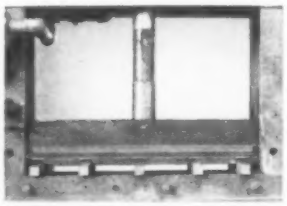
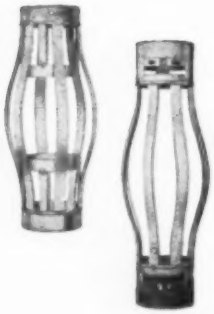


Spring in position in hydraulic press for flattening test.



The tightest hole could not flatten any spring more than this.

The specified bowed height (reach) must be present after the slight permanent set.



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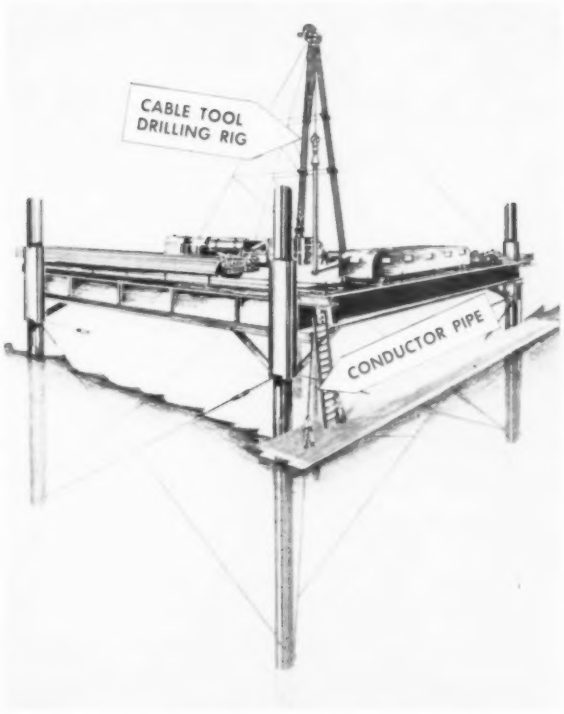

MOBILE DRILLING PLATFORM (left) will be completed within a few weeks. It will be towed to the drillsite (map), where . . .

Lake Erie Test Will Start Next Month

The first test on the American side of Lake Erie is scheduled to be spudded within a few weeks off the Pennsylvania shore.

The test will be drilled by a contractor, yet to be selected, for New York State Natural Gas Corp.

The mobile drilling platform to be used is now being completed in Erie, Pa., by Dravo Corp. It is expected to be ready around Apr. 30, and will be towed immediately to the drill site, located in Block 1, a 19,130-acre tract lying in the lake off the Pennsylvania-Ohio border.

Offshore operations on the Canadian side of the lake have been going on since 1913 (PW—May17'57,p14). About 80 wells have been completed, some as much as 5 mi. offshore.

Activity on the American side, however, was stymied until Pennsylvania accepted bids by New York State Natural Gas on two blocks last summer (PW—Sep.27'57,p6).

If the test is successful, divers will be used to complete it on the lake bottom, in waters 38 ft. deep.

The divers will install a cellar, master gate, Christmas tree, and gathering lines.

Such underwater completions are necessary because ice conditions in the lake during the winter months would shear off any wellheads built above the water line. This procedure has been followed extensively by Canadian operators on the opposite shore of the lake.

Divers also would be used should any repairs be required once the test was completed. But a platform would have to be moved into place and conductor pipe set up if any downhole treatment was required.

The test will be drilled with cable tools (as is the practice on the Canadian side of the lake), from a mobile, 50-ft.-sq. platform

The platform consists of five pontoons pinned together, and four legs, each 130 ft. long and 36 in. in diameter. Two 100-ton hydraulic jacks at each leg will be used to raise the platform about 25 ft. above the water.

Drilling crews will be taken ashore after completing their shifts. For emergencies, however, a trailer that will provide eating and sleeping facilities for six men will be located on the platform.

The first test is expected to be completed about 90 days after spudding.

The venture will be located 3,500 ft. offshore. Under terms of the lease, no test can be drilled less than ½ mi. from shore. The maximum distance specified in the lease varies, with 6½ mi. being the average.

Drilling will be limited to what corresponds to the lake navigation season —from about Apr. 15 to Nov. 15. Ice and frigid winds prohibit operations in the winter and early spring.

Drilling operations will be administered out of Conneaut, in northeast Ohio.

New York State Natural Gas geologists say gas may be found in any of five formations.

The formations are the Oriskany, Lockport, Medina, Trenton, and Gatesburg. The Oriskany (the shallowest) is found at about 1,500 ft., and the Gatesburg (the deepest) around 5,780 ft.

Though the company is drilling for gas, it is not ruling out the possibility of oil production.

Known trends of oil and gas production range from Ohio into Canada and New York (map).

Navajo Bid Rejections Stir Up a Fuss

The rejection by the Navajo Indians of certain bids on Utah acreage has kicked up quite a stir among some oil men in the area.

The tribe—which has collected almost $30-million from the series of four lease sales that ended last month—turned down bids amounting to more than $250,000 on six tracts between the Aneth pool and the Desert Creek area, San Juan County.

The tracts were included in the lease sale of Dec. 10, 1957. Oil men are protesting the fact that the bids were not rejected until several months after the sale.

The decision by the Navajos to reject these bids has been challenged by Mohawk Petroleum Corp.

The protest, by Mohawk vice-president Malcolm McDuffie, follows on the heels of the rejection of 26 bids offered at the January and February sales.

Mohawk charges that the Navajos deliberately stalled acceptance of bids for 96 days, while drilling by two operators validated acreage that was still open to lease.

In his protest, McDuffie said: "We wish to be advised if you would have rejected our bid if a dry hole had been drilled offsetting tract 8 (Mohawk's tract) during the 96-day period."

The principal well that validated acreage open to lease was Phillips-Aztec No. 2 Navajo, section 16-41s-24e, completed flowing 1,620 b/d through ¾-in. choke and perforations at 5,508-34 ft. and 5,613-38 ft.

But other tight holes drilled in a southern extension of Aneth pool by The Texas Co. and by Superior Oil Co. of California in the East Desert Creek area were also considered important to bidding.

At a recent hearing on spacing in the Desert Creek area, Phillips geologists told the Utah Oil & Gas Conservation Commission that the No. 2 Navajo proved that the Ratherford field, between Aneth and Desert Creek, and Aneth pool were connected, insofar as hydraulics was concerned.

In a letter to the tribe, Mohawk asked that the company's bid be accepted "in accordance with established procedures."

McDuffie's letter said: "On Mar. 17, 1958, 96 days after submitting our bid on tract 8, offered at the Dec. 10 sale, we received rejection of our high bid. We consider this delayed rejection eminently unfair."

A statement by the Navajo tribe said that the tribe will do all it can to shorten delays in the future, but that it will continue to reject any bid it feels inadequate, and not in the tribe's "best interest."

Said Maurice McCabe, executive secretary of the Tribal Council: "Our rejection of all bids on certain tracts appears to have been misunderstood, and also our delay in taking action.

"The tribe was just as anxious as the oil companies to see that results of the bidding on certain tracts were released in sufficient time to enable them, if they wished, to apply the monies deposited with the rejected bids to some bids submitted at the Mar. 19 sale.

"However, the large acreages involved and the great amount of study necessary to evaluate the bids fairly made this impossible."

"Our rejection of all bids on certain tracts should not come as a shock to anyone," the statement said.

"We gave advance notice of our new policy by a resolution adopted Oct. 16, 1955."

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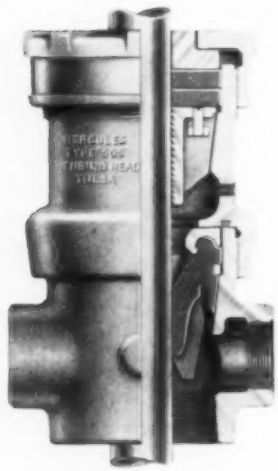

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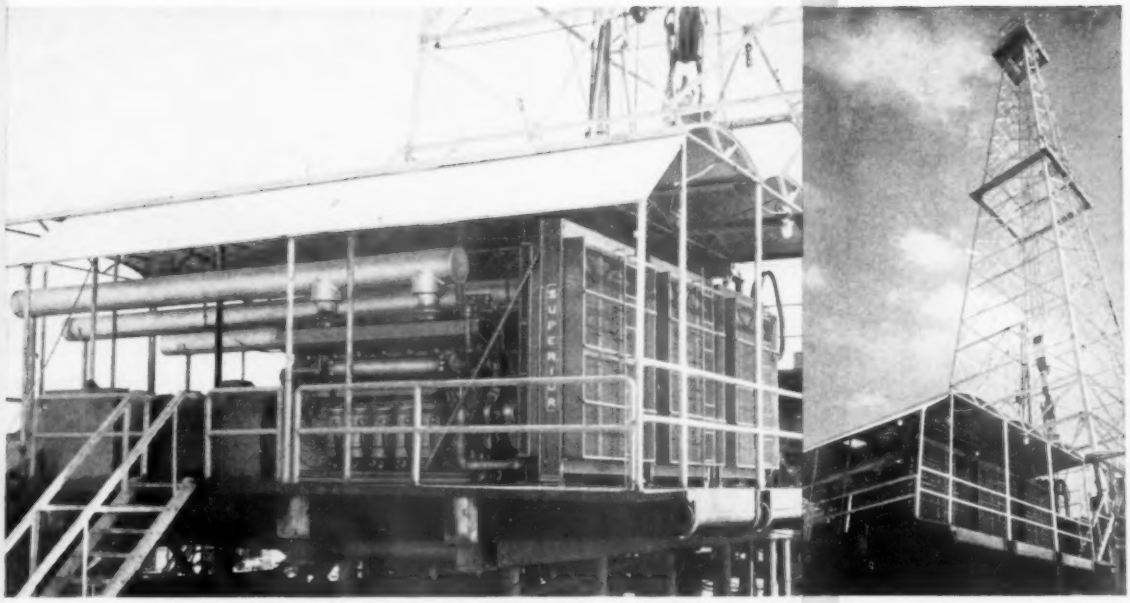

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Pumps Have Their 'Heartbeat' Checked

By applying electronics to mud pump behavior, Mission Mfg. Co. has found some answers as to why mud pumps behave the way they do.

Mission, a manufacturer of many types of oilfield equipment, doesn't make pumps. Says Walter E. Liljestrand, chief research engineer: "Mission definitely is not in the pump business. We cooperate with pump manufacturers, not compete with them. We work with the manufacturers and the customers of our products, conducting pump studies for them."

The answers were obtained through testing and study in Mission's "Test Pump Laboratory," at its Houston plant, supplemented by field tests.

Until relatively recent years, not even the instruments for such studies existed. By applying advanced instrumentation, and running hundreds of tests, Mission has worked out simplified methods of calculating pump conditions and ways of correcting quirks in the system.

The research program has two primary objectives: wear-testing of pump parts, and fundamental pump research.

In the wear-testing part of the program, different pump parts are put through their paces under all kinds of conditions and stresses, often to the destruction point. This is done to determine weaknesses and the need for modification and design changes.

Testing is a continuous procedure, with as many as four or five different parts being tested simultaneously in one pump. It requires careful advance planning and sometimes complete pump overhaul and refitting.

Fundamental pump research involves an exhaustive analysis—with an oscillograph—of the entire pump system and each component part.

In order to do this kind of study, Mission had the Southwest Research Institute, of San Antonio, design and assemble $25,000 worth of oscillograph equipment.

The equipment provides complete instrumentation of the pump system, inside and out, under all conditions.

Such fundamental problems as high speed "knock" and drilling fluid "surges" are investigated.

In one sense, the mud pump can be called the "heart" of the drilling rig and the oscillograph procedure can be likened to an electrocardiogram.

The sensitive oscillograph, connected to the pump system by a maze of wiring and detecting instruments, reels off a continuous graphic record—in increments of 1/100 of a second—of such functions as suction pressure, cylinder pressure, discharge pressure, valve motions, and rod load.

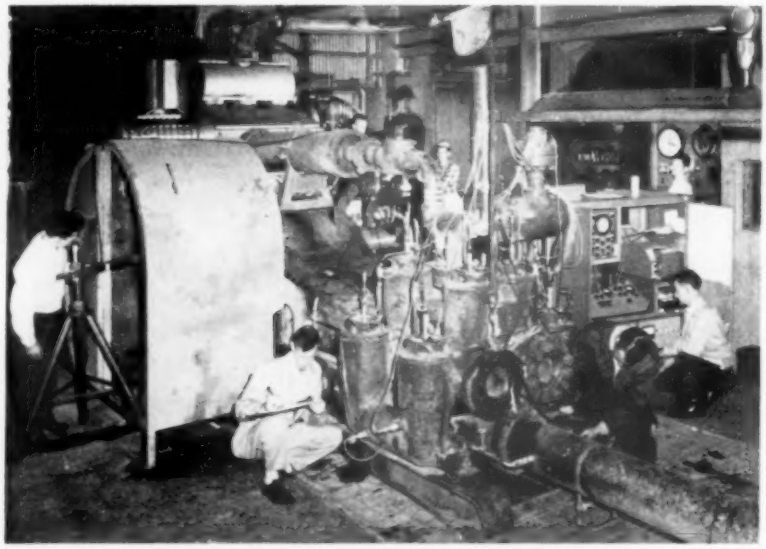
Close study and evaluation of the permanent records is revealing functions, and interrelationships of functions, previously unsuspected.

The basic research has two broad targets: It's trying to pin down the mechanical efficiency and the volumetric efficiency of mud pumps.

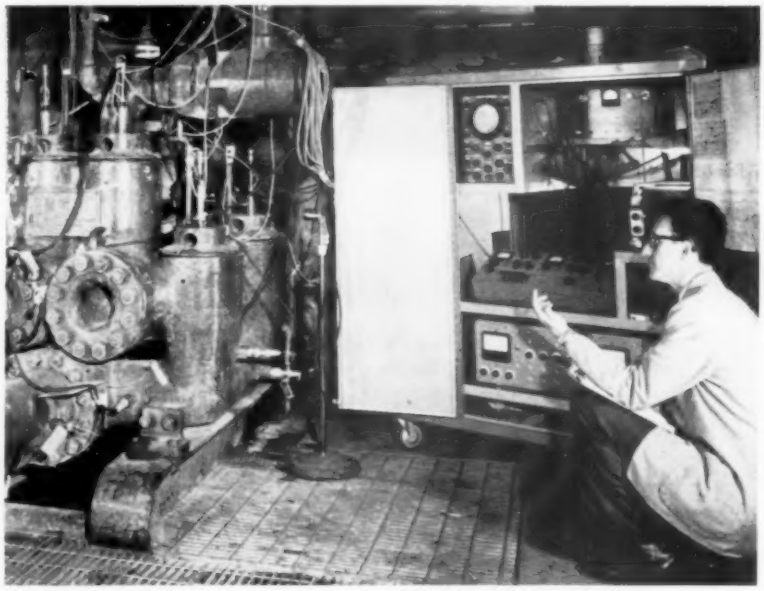
"As much as we possibly can, we are trying to 'divide up' the pumps into their components, to study each individual part, in arriving at the many answers we'll need," says project engineer Sam Collier.

So far, Mission has conducted more than 2,600 oscillograph studies.

The company first started the test



OVER-ALL VIEW: In Mission Mfg. Co.'s mud pump testing laboratory, pumps are put through their paces, operational problems are solved, and new equipment is devised.



CLOSEUP: The heart of the pump laboratory is this oscillograph, which records the 'heartbeat' of the pump and its parts, and picks up 'quirks' in the system.

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LeTourneau mobile platforms now in use have proved that they are capable of handling the tough offshore drilling problems caused by adverse weather and bottom conditions. Here are the reasons:

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- **LEVELING**—Independently operating legs allow perfect leveling of platform eliminating the need for leveling the derrick.
- **SHEAR VALUES**—Variations in shear values and bottom contour are easily compensated for by independently operated legs.

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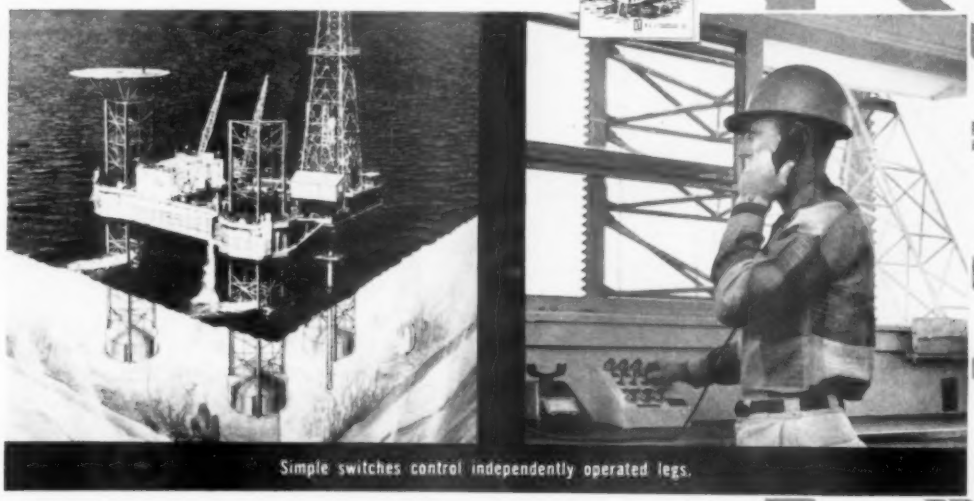

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pump lab in 1936, when it installed one pump, largely to test parts under controlled conditions.

At present, the laboratory is operating two pumps, one 7½ x 14 (diameter of the piston and the stroke of the pump), with a 14,000 hp. rating, powered by a 600 hp. Climax natural gas engine. The other is a 7½ x 16, powered by an 850 hp. GMC Dual-Fuel Diesel engine.

Now being installed is a large 8¼ x 18, following the completion of a series of tests with an 8 x 20. This pump will be driven by two Vlrobu Waukesha engines for operation in the 3,000-5,000 psi. pressure range.

Pumps used in the testing program have very little down time. Everything is operated at full capacity.

The pumps are run 400 or 500 hours each month—at full pressure and full speed—in contrast to normal field operations where pumps seldom are pushed to full capacity for any length of time.

"Everything is always loaded to the limit—that gives us the real capacity of the pump and parts," explains Byron Wehner, chief development engineer in charge of wear testing and studies.

Mud tank hook-up and flow-line valve arrangements are designed for maximum flexibility when a pump is operated at full capacity, or when simulated abnormalities are introduced into the testing program.

Both water-based and oil-based muds—high-sand-content mud which has been used in drilling operations—are used for testing.

Various kinds of accessory equipment—dampeners, super-chargers, etc.—are added at various times to study pump performance under difficult conditions.

Mission says it has had excellent practical results from both parts testing and basic research. Among the results:

- New and improved parts have been developed. Mission's "Mud Monarch" valve for use in high-pressure mud pumps was one of the first products to evolve from the testing program. The program also has resulted in 10 piston design changes within the past few years.
- The program permits manufacturers of pumps and parts to give what otherwise would be impractical guarantees.
- The oscillograph studies have resulted in a better understanding of how suction and discharge pressures actually affect the pump.

As valuable as it is, however, the test pump laboratory hasn't replaced field testing, which Mission considers the final proving ground for new and improved products.

Fresh Water Licks Salted Wells

New Mexico wells that "salt up," instead of sanding up, are being produced successfully with periodic fresh-water treatments.

Back in June, 1953, Neville G. Penrose, Ft. Worth independent, drilled the No. 1 Zimmerman, the original discovery for the Caprock Queen sand pool, in New Mexico's Chavez County.

First called the Drickey field, the Caprock Queen sand extended the older Caprock field, which lies north-northeast.

There now are some 200 wells in the Caprock Queen sand, 45 of which are operated by Penrose.

The Penrose wells average about 3,000 ft. in depth, ranging from 2,800 ft. to 3,150 ft. The wells produce 28- to 30-gravity oil.

It wasn't long after the discovery was put on pump that solid salt formed in the borehole, sticking the pump and plugging tubing and flow lines.

At first, the problem appeared to be a major one. But plain fresh water turned out to be an unexpectedly simple solution.

The fresh water simply is "dumped down" the tubing-casing annulus.

Periodically now, at intervals of from two weeks to a month, a water tank truck pulls up to each of the wells, a line is hooked into the well-head assembly, and from 5 bbl. to 10 bbl. of water flows into the annulus by gravity.

During the production pumping action, the fresh water mixes with any salt that has been solidifying and helps wash it harmlessly to the surface with the crude.

The salt apparently is part of the cementing material contained in the producing sand itself.

The discovery was drilled with a cable tool rig. During the drilling, it was observed that the white-gray frosted grains in the Queen sand were impregnated with salt.

The salt evidently is being washed into the well bore with the crude, and eventually forms a salt cake.

The treatment isn't cheap, because of the high cost of water in the area. But it's relatively simple, and it seems to have licked the problem.

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Foaming Agents Improve Air Drilling

Results of a Panhandle test indicate that foam drilling can handle large water flows. But foam drilling is slower than dry drilling, and more expensive.

The use of foaming agents is expected to increase air drilling and permit greater savings to be made in the future, says R. M. Reed, of Shell Oil Co.

Air- and gas-drilling potentialities have been recognized for years. Until recently, however, efforts to capitalize on them have been limited to certain interior drilling areas where formations offer no problem.

Reed says that not only are penetration-rate increases often spectacular, but lost circulation ceases to be a problem if air can be utilized as the circulating medium.

In many cases, he adds, alleviation of lost circulation, in itself, can be sufficient justification for air drilling.

Where water-bearing formations are encountered, air drilling is usually abandoned in favor of conventional drilling methods.

Damp, or weeping, zones cause balling-up of cuttings, and present the danger of stuck drill pipe.

Periodic slugging with water to flush the hole has sometimes been useful in the past to control the problem of water influx.

Reed notes that larger flows of formation water have been handled where adequate compressor capacity is available, and if exposed formations do not slough in the presence of water.

Drilling progress suffers under either condition, however, principally because of time-consuming operational procedures found necessary in handling water influx.

The use of foaming agents, however, offers the promise of relieving water-handling problems through increases in lift efficiency and aeration of the circulating system, says Reed.

The foaming agent combines with water to form a light foam in the well bore, and disperses wet, balled-up cuttings. The aerated column of foam floats the cuttings to the surface at lower pressures than water alone.

The foam rapidly disintegrates in the open air, and the water can be recirculated.

Here's how a foaming agent is used in actual drilling operations:

When water starts to penetrate the well bore, cuttings immediately begin to stick together and jam the drill pipe.

When this happens, the circulation pressure recording chart shows a gradual increase in pressure. This pressure also may begin to fluctuate widely.

At this point, the foaming agent is injected into the air stream. If there is no change in the pressure characteristics, it means that there is not enough water to form a foam. So the sufactant is then mixed with water in surface tanks and the mixture is injected into the air stream.

Reed reported on the use of a foaming agent in the air drilling of Shell's No. 2-B Alamosa Ranch, Oldham County, in the Palo Duro Basin of the Texas Panhandle.

The decision to use a foaming agent in this test was made after preliminary studies, based on logs of nearby wells, indicated the probability of encountering sizeable water flows in the Wolfcampian series of Permian age in the No. 2-B.

This area is one where lost circulation has proved to be the principal drilling problem.

Lightweight, 40% oil-emulsion muds, batch-treating of losses with heavy concentration of lost-circulation material, and careful rig operating techniques had all been used with only limited success in combatting this problem, Reed reported.

Results of drilling this test with foaming agents were reported this week at the spring meeting of the American Petroleum Institute's Mid-Continent District, Division of Production, in Oklahoma City.

Though conclusions admittedly are limited because they are based on this one test, Reed believes the use of foaming agents is one way to solve the problem of water influx in air drilling.

Reed said the following conclusions were indicated by the experimental use of foaming agents in the No. 2-B Alamosa Ranch:

(1) Operationally, it is possible to handle large water flows successfully with foaming agents while air drilling.

(2) Economically, the amount of water influx that can be tolerated while foam drilling is limited by the cost of the foaming agents and the reduced penetration-rate advantage over mud.

(3) Use of foaming agents reduces the circulating pressure requirements while handling water influx.

(4) Penetration rates are slower with foam drilling than with dry drilling, but both are faster than mud drilling.

(5) Unless inhibitors are used, drillpipe corrosion can become a problem, even while using saturated lime water for injection purposes.

The use of foam drilling on the No. 2-B Alamosa Ranch was 60% faster than drilling with mud, Reed said.

The 12¼-in. surface hole was drilled to 900 ft. with mud, and logged to insure that all surface water sands had been penetrated.

The interval from 900 ft. to 4,177 ft. was drilled dry through shale, anhydrite, salt, and dolomite.

The hole mudded-up at 4,177 ft. and 9⅝-in. casing was cemented at 4,174 ft. After various tests with foaming agents in the cased hole, cement was drilled, the hole dried, and dry drilling commenced.

Between 4,734 ft. and 6,699 ft., a continuous injection of water and foaming agent was maintained during drilling. Formation-water influx varied from 1 bbl. to 60 bbl. per hour.

Injection rates varied from 1½ bbl. to 12 bbl. of water per hour, with from 1 gal. to 6½ gal. of foaming agent.

Best results were obtained at a continuous injection rate of approximately 4 bbl. of water per hour, with the amount of foaming agent used varied to suit conditions.

Formations drilled in this interval included hard shale, dolomite, and limestone with some chert.

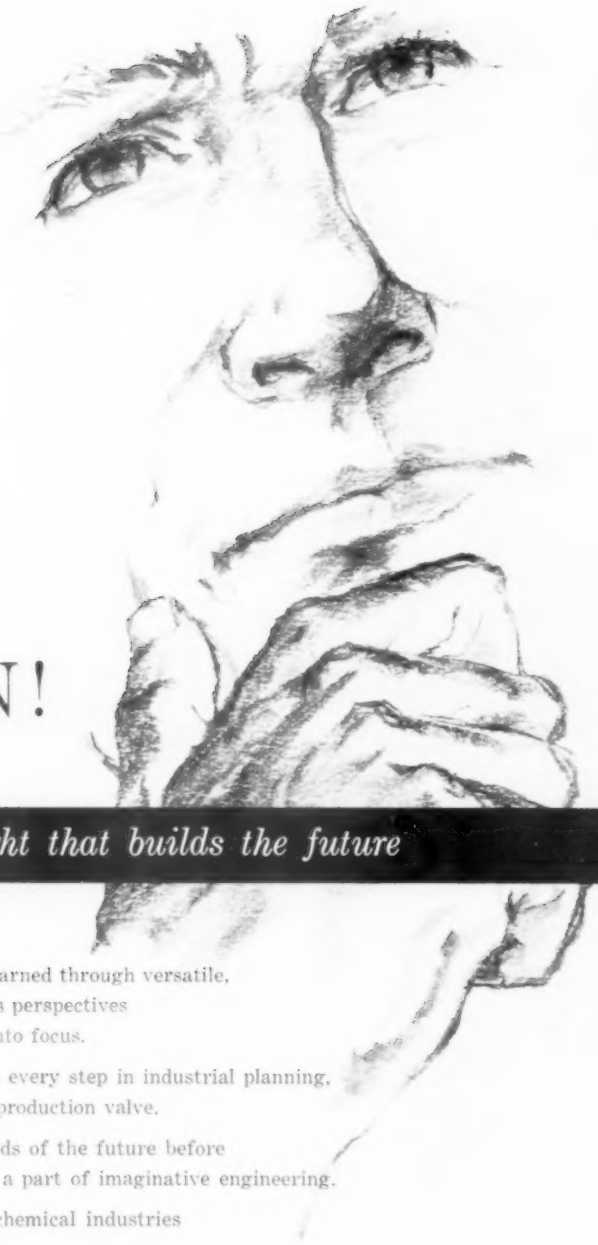
When starting out of the hole at 6,241 ft., the drill pipe stuck 25 ft. off bottom. Five gal. of foaming agent with water were batched into the hole and pipe was free after air was circulated for 20 minutes. No further trouble was experienced on this trip.

Either 1,400 cu. ft. per minute of air or 2,100 cu. ft. of air per minute was used, depending upon the pressure requirements.

At 6,699 ft., the hole was mudded-up to core the two objective zones, and drilling continued with mud to a total depth of 7,740 ft.

Reed reported that while only 43% as many rotating hours were required in the air-drilled well, 62% as many total days were needed.

This variance was due, in part, to the time spent in conducting special tests, training crews, and developing suitable operating techniques, Reed explained.



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How Much Power Does a Pump Need?

Oil field pumping units could be equipped with electric motors at much lower costs than at present, says M. H. Halderson, Phillips Petroleum Co. What's needed: more work on the power requirements of pumping units, so that motors can be used more efficiently.

Halderson told a recent meeting of the American Institute of Electrical Engineers that motors that drive pumping units must be operated on less amperages that is stated on the motor's nameplate, if they are to be operated without becoming overloaded.

In other words, rated, or nameplate, capacity is not the operating capacity of the motor.

A motor driving a pumping unit is subjected to a continuous cyclic load —an alternating stress in which the average current given out by the motor may be far below the peak required at short, recurring intervals—or it may be close to the peak demand.

In the field, electric motors are usually applied to develop a power output less than a motor's nameplate rating, says Halderson. This results in an operational problem:

- **If the average current output is too low, the motor will overheat.** If the current output is too far below the rated, or nameplate, capacity of the motor, it is unable to cope with the recurring peak demand. If the motor becomes overheated, the insulation will burn, causing a possible short circuit, or trouble the next time high power output is needed.

- **If the average current output is too high, power is wasted.** If the output is close to the peak demand, current is more than sufficient for the "peaks" but is wasted on the "dips."

What is needed, says Halderson, is a program of field testing that would determine the actual power requirements of electric motors for pumping equipment.

A producer must know, Halderson said, what percentage of a motor's rated capacity he can expect to be able to use without burning out the motor. At present, he said, such information is scarce, and, therefore, costs are higher than necessary.

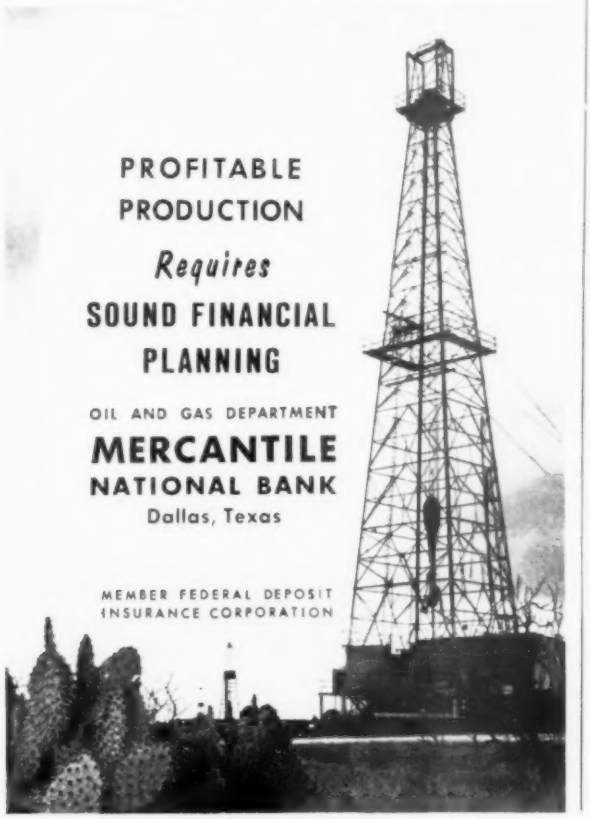
Several instruments are available that can be used to determine the power requirements of motors under field conditions.

By measuring the average current output with one of them—a thermal ammeter—it is possible to determine if a motor is thermally overloaded. If the measured average current, over a given period of time, is higher than the given rated current of a motor on its nameplate, the motor is loaded beyond its rated capacity, Halderson said.

Halderson recommended that field production offices be provided with the instruments necessary for taking electric measurements on motors, and that field personnel be trained to obtain accurate data.

If such a program were followed, Halderson said, the right answers would be known in a year or two, and the job of equipping pumping units with electric motors could be accomplished properly at the lowest possible cost.

To reach general conclusions regarding the relationship of peak load to average load requires that tests be made on many electric-motor-driven pumping units, said Halderson. The greater the number of tests, the more certain will the limits of electric motors driving pumping units be established.



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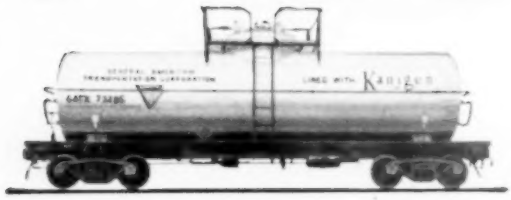

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What's New / IN EXPLORATION, DRILLING, PRODUCTION

Alberta Clears Way For First Unit Plan

Alberta's first recognized oil field is slated to become the first to be unitized where necessary, by special direction of the provincial government.

Legislation providing for unitization of certain parts of the old Turner Valley field, 40 mi. south of Calgary, has been introduced by Alberta premier E. C. Manning, to clear the way for measures designed to increase ultimate recovery of oil and gas.

The legislation does not represent compulsory unitization, although the government has the power to enforce it when necessary.

In the case of Turner Valley, it might take many years to locate all the persons with interests in the field, in order to call the usual type of vote on unitization proposals.

Officials of the provincial Mines & Minerals Dept. pointed out that, when the Turner Valley development started in the 1920s, many operations were financed by selling royalty shares, with the result that as many as 500 people still hold a royalty interest in a single well.

Under the proposed legislation, royalty interests would not be involved, and approval would be needed from 50% or less of the working interests.

•

Properties Change Hands

Titan-Tex Drilling & Production Corp., Shreveport, has bought producing properties in five states.

The acquisition includes 37 producing oil and gas wells in Mississippi, Louisiana, Arkansas, Oklahoma, and Texas, with reserves of more than 340,000 bbl. of oil and 2½-billion cu. ft. of gas.

The Oklahoma property was bought from Dominy Oil Co. and others. All other property was acquired from Mississippi interests.

Heritage Petroleum Corp., Dallas, has bought 13 oil wells in the South Orla field, Reeves County, West Texas, from Buffalo Oil Co., Tulsa.

The wells are on nine leases. Also purchased were 3,512 acres of undeveloped leases in the same area.

Forest Oil Corp has sold its interest in the Dora Roberts field, Midland County, West Texas, to General American Oil Co. for $16-million.

Forest will receive 90% of this sum in oil payments, 10% in cash.

General American estimates its net reserves recoverable from the Forest interest at 13-million bbl. of crude and condensate and 60-billion cu. ft. of gas.

•

California Field Closed

Union Oil Co. of California has decided to close the Purisma oil field, Santa Barbara County, Calif., "because of the general economic situation."

A company spokesman says the field has 100 wells, with total capacity of 25,000 b/d. Recently, only 40 wells have been operating, producing about 950 b/d.

He says the shutdown will continue until there is a change in economic conditions, adding that "practically all oil companies are coming down in operations, due to an oversupply of oil products."

The Purisma field is one of the oldest in the area, dating back 50 years.

•

The multimillion-dollar question of whether Citronelle field, in southwest Alabama, can be waterflooded has received an affirmative answer.

Core Laboratories, Inc., Dallas, has given a preliminary oral report to operators in the field, which said that waterflooding will increase production to three to four times more than primary recovery.

A full report from Core Lab is expected this month.

It is expected to prompt a stepup of meetings between operators, in an attempt to lay the groundwork for unitization and secondary recovery in the field.

But a new question popped up when Magnolia Petroleum Co. No. 1-A School Lands, nearly 2 mi. southeast of previous production, flowed 281 bbl. in 23 hours from the Rodessa at 10,875-11,153 ft.

There is a difference of opinion as to whether the well is an extension of the field or a new field. Magnolia geologists think it is an extension. Walter B. Jones, state geologist and oil and gas supervisor, says there is "a good possibility" that it may be a new structure.

•

A new seismic method that uses a mechanical earth vibrator and a huge electronic computer is being developed by Continental Oil Co.

John M. Crawford and William E. N. Doty, both of Continental, say that the system—called Vibroseis—is "difficult and expensive and still in the experimental stages."

"It is hoped that the new method will eventually replace or supplement the conventional hazardous dynamiting method now used in seismic work," says Crawford, "but our problems are not all solved."

The earth vibrator used in the Vibroseis method is 18 in. long, and is mounted on a trailer. Counter-rotating weights in the vibrator pound the earth. Sound waves travel through the earth and are reflected to the surface, where they are recorded on magnetic tape. The tape is run through the computer, and emerges as a "Vibrogram" chart. The computer provides in 10 minutes a mathematical solution that would keep a desk calculator busy for over five years, the company says.

•

An offshore rig in the Gulf of Mexico has a new twist in ship-to-shore communications: a dial telephone.

The telephone has been installed by Cameron (La.) Telephone Co., aboard Shell Oil Co.'s No. 10 rig, operating 40 mi. from shore in West Cameron Block 192.

It is a pilot system, and if successful will open the way for other dial service on rigs and platforms in remote areas and other tideland locations in Southwest Louisiana.

The telephone is a 25-watt VHF radio, whose signals are picked up by a shore radio tower.

•

A new pumping unit for oil field fracturing jobs has been introduced by The Western Co., Midland, Tex.

The new truck-mounted unit provides greater power output without an increase in the rated horsepower of the pump engine, according to Walter Beadle, Western vice-president.

The increase in available power for the pump is accomplished by an ar-

rangement whereby the chassis engine, under the hood of the truck, powers all auxiliary equipment during pumping operations, freeing the deck-mounted diesel to apply full power to the pump.

•

Shell Oil Co. has asked the Texas Railroad Commission for permanent authorization to use ACT installations in several commission districts.

Shell requested permission to use permanently an ACT system it installed in the Wasson field, Gaines County, plus any other like it which it may install in the West Central Texas and West Texas commission districts.

Phillips Petroleum Co. also urged the commission to take some sort of action to give administrative approval to ACT systems that have been tried and proven.

Service Pipe Line Co. said that it is willing to go along with such systems, and accept oil transferred by them.

A Shell engineer told the commission that the ACT units now operating in the Wasson field under temporary permit have proved efficient and accurate. He said that Shell has made provisions for installations of ACT units on several other leases in the area.

•

A new percussion-rotary drilling tool whose efficiency is not affected by submersion in water has been introduced by Schramm, Inc.

The "Rototool," similar in principle to Gardner-Denver's Mole-Dril (PW—Dec.6'57,p24), can be used for exploratory and seismic work, and in pipeline work.

The tool, which works like a jackhammer at the bottom of the hole, has only three moving parts.

•

The California state senate has passed a bill calling for unitization and repressurization of the Long Beach subsidence area.

After the state assembly agrees to minor amendments — considered a formality — the measure will go to Gov. Goodwin J. Knight, who has indicated that he will sign it.

•

An increase in Canada's oil consumption should be met from supplies available in Western Canada, says W. Harold Rea, president, Canadian Oil Cos., Ltd.

This could be brought about, he told the annual shareholders' meeting, by locating any new refineries along the existing pipeline from Western Canada to Toronto.

"All refineries in Canada operating within reach of the Canadian crude supply should use it," he said. "This will have the effect of moving the orbit of Canadian crude steadily eastward, and, in time, most if not all of the Ontario market could be supplied by Canadian crude."

•

Drilling Highlights

California—Reserve Oil & Gas Co. No. 318-17 Standard-Butler-Wchr-SPR, section 17-11n-19w, Kern County, was completed for 3,120 b/d of 34.5-gravity oil, the biggest completion in the state in recent years. Production was through 30/64-in. choke and perforations at 11,599-12,179 ft. in the Vedder sand. The well is the third to be completed in the year-old North Tejon pool (PW—Dec.27'57,p18).

South Louisiana—Southwest Gas Producing Co. and Argo Oil Corp. No. 1 Giles Dupuy, section 33-13s-9e, St. Mary Parish gas-distillate pay opener, tested to flow 3.8-million cu. ft. of gas daily and an estimated 200 b/d of distillate through small choke and perforations at 11,698-710 ft. The well is 1 mi. east of Jeanerette field.

In Iberia Parish, Kilroy Co. of Texas No. 1 Brownell-Kidd Lumber Co., section 19-12s-11e, 1 mi. east of Bayou Pigeon field, was completed as a gas distillate recovery, flowing 3,400,00 cu. ft. of gas daily and 102 b/d of distillate through perforations at 12,243-50 ft.

East Texas—Grelling Estate No. 1 D. M. Bassham, J. A. Craft survey, Hopkins County Smackover lime discovery, had a preliminary flow of 2-million cu. ft. of gas daily plus 100 bbl. of condensate per million through 3/16-in. choke and perforations at 9,324-29 ft.

Mississippi—Shell Oil Co. No. 1 Jarrett, section 25-16s-5e, Clay County reopener for Siloam field, was completed for 2,970,000 cu. ft. of gas and 16 b/d of distillate through perforations at 8,536-620 ft.

New Mexico—W. R. Weaver No. 1 McAdams, section 34-27n-10w, San Juan County, was completed for 9,010,000 cu. ft. of gas daily and 72 b/d of distillate through 3/4-in. choke and perforations at 6,106-40 ft. and 6,237-84 ft. in the Gallup. The discovery is in Fulcher-Kutz field, which produces from the Pictured Cliffs.

West Texas—Hamilton Brothers, Ltd., and Zapata Petroleum Corp. No. 1-8 L. C. Clark, section 8, block 32, T-4-S, T&P survey, Glasscock County, has been recompleted as a Pennsylvanian discovery for 193 b/d through 3/4-in. choke and perforations at 8,238-586 ft.

The well was originally completed from the Fusselman at 9,816-30 ft. That production was opened in July, 1957.

Oklahoma — Ussram Exploration Co. No. 1 Emma J. Wavehoff, section 13-13n-5e, Lincoln County pool opener 2½ mi. northwest of Arlington, was completed for 165 b/d of 41-gravity oil through Pure sand perforations at 3,182-94 ft.

In Marshall County, Shell Oil Co. No. 1 Little, section 15-8s-5e, strat test 3 mi. southwest of Isom Springs pool, recovered 2,450 ft. of heavily gas-cut 39-gravity oil and 90 ft. of gas-cut mud on 1-hour drillstem test at 2,803-53 ft. in the Deese (Pennsylvanian). Gas came to the surface in 12 minutes.

Wyoming—El Paso Natural Gas Co. No. 2 Desert Springs Unit, section 22-21n-92w, Sweetwater County, flowed 12-million cu. ft. of gas daily from the Lewis sand through perforations at 5,083-103 ft., after fracture treatment. The unit block is 14 mi. north of Table Rock field.

Nebraska—British American Oil Producing Co. No. 1 Allchin, section 10-12n-56w, Kimball County, flowed oil at the rate of 50 bbl. per hour on drillstem test at 6,538-48 ft. in the J sand. The pool opener is 1 mi. north of Ansel field.

Alberta—Jefferson Lake Sulphur Co. No. 11-11 North Calgary, near Calgary, was completed for 65-million cu. ft. of gas daily through perforations at 7,439-79 ft. in the Elkton (Mississippian). The gas discovery is located 5 mi. southeast of production.

Southwest Texas—Ginther, Warren & Ginther-Gulf-Halbouty No. 1-A O. W. Killam, deep Webb County wildcat which blew out, was being killed this week. The project blew out at 13,998 ft., in what geologists believe to be either the Buda or Austin formation. Fire broke out, but was quickly extinguished. One geologist estimated bottomhole pressure at 14,000 psi.

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The centralized controls on National Supply's new diesel electric rigs are easy to operate.

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...especially suitable for offshore service!

Here's the big first in a new series of National Supply Rigs designed for electric application! It's the 1625DE, built for drilling from 16,000 to 25,000 feet, using 1⅜" or 1½" wire line, and utilizing 1,300 to 2,000 horsepower delivered through electric motor drives.

In the 1625DE, you'll find all the field-proved features of National Rig construction combined with a simplified, highly flexible power package. Because of its light weight and compact hook-up, this completely integrated drilling system is a natural for offshore service, where platform space is expensive.

National's 1625DE draw works is basically a one-piece design on an 18-inch beam base. Its front and rear sections are detachable for easy transportation, and it includes these outstanding features:

Centralized controls—The draw works' continuously variable control and rotary torque control are centralized and simplified for easy operation. The flexibility of electric power permits infinite speed control with fewer steps on the draw works.

This is one of the offshore platforms on which a National 1625DE Rig is in service.

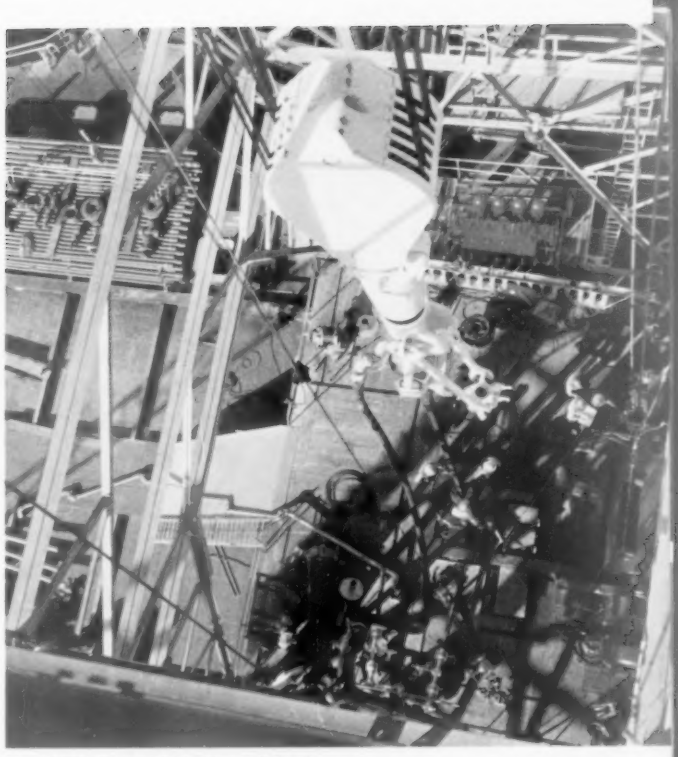
Four hoisting speeds—Transmission shaft carries two drives to the drum, and motor drive rear section includes primary shaft with two selective speed chain drives. Drives are arranged to obtain most efficient use of power and insure fastest operation in line with good drilling practice. Two speeds are available to catheads (and sand reel, if used) and rotary drive.

Large integrally grooved spooling drum—36″ x 61¼″ drum permits hoisting 135 ft. stands of pipe with eight lines without spooling more than three layers on the drum . . . has National Spirallel Grooving, surface-hardened at points of wear.

K-62 Compound Equalizing Brake—Designed especially for this size drum, this National drum brake is the most efficient one in the industry.

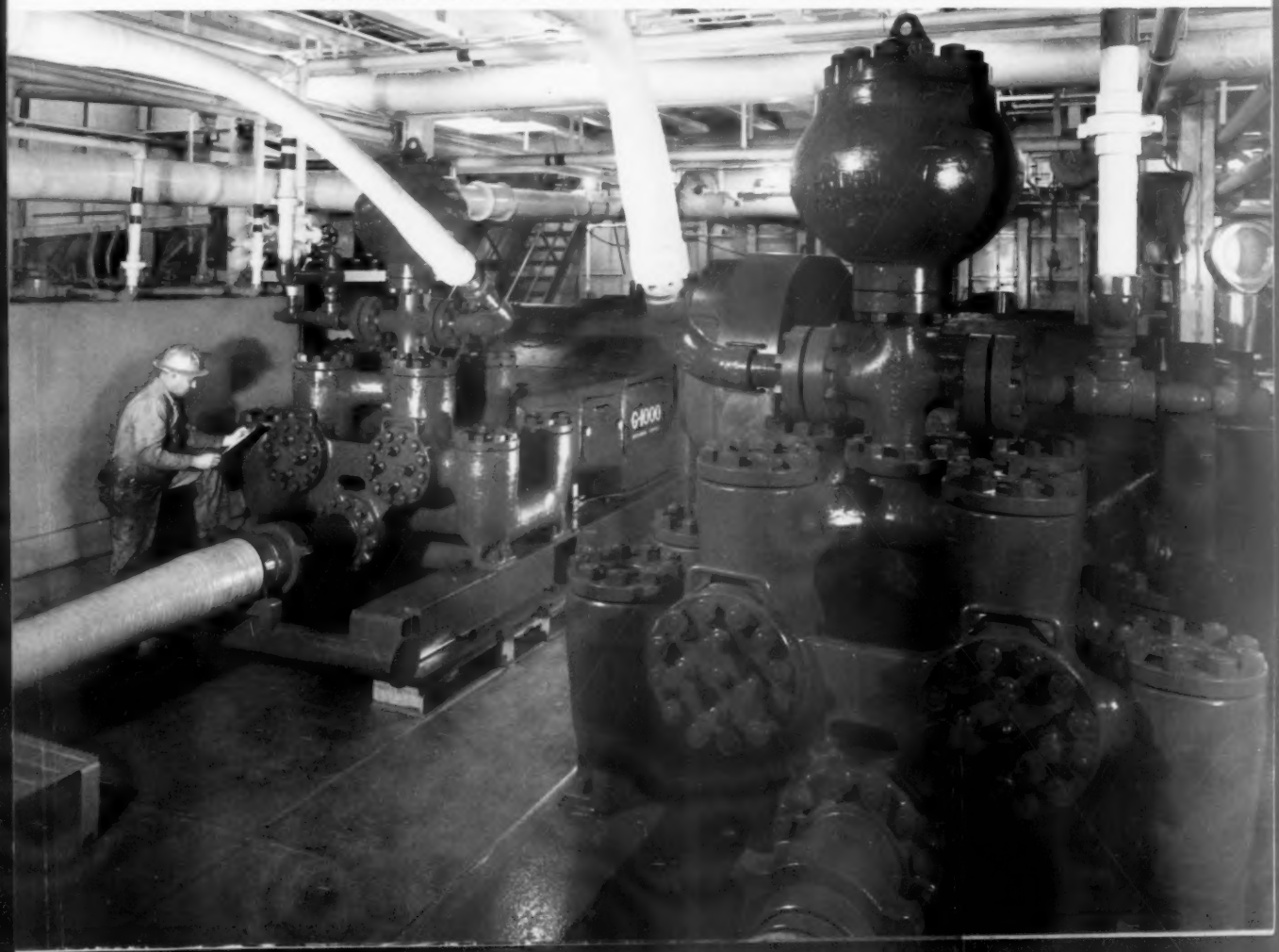
Air friction clutches—Used on the drum shaft to provide ease of operation and eliminate shock

continued next page



Overhead view of the rig at left shows more National equipment in service.

Dependable National Slush Pumps help keep mud system costs to a minimum.



New National DIESEL ELECTRIC Rig

(continued)

loading. A special National feature is a jaw clutch built inside the low drum clutch for standby purposes.

National Type A Catheads—Years of trouble-free service have proved the high quality of these important draw works elements.

Draw Works Electric Motor Drive—For the 1625DE, power may be two or three 625/650 h.p. DC motors or two 1,000 h.p. motors—coupled at the rear of the draw works.

NATIONAL 1320DE RIG ALSO AVAILABLE!

The 1320DE is another diesel electric draw works available in the National line. It is designed for drilling from 13,000 to 20,000 feet, and incorporates the same outstanding features of the 1625DE. For complete information on either of these rigs, contact the National Supply representative in your area.

This is the drive group section that complements the 1625DE shown on the previous pages. National Drive Groups are factory pre-aligned, easy to hook up and tear down. Each section is a completely self-contained unit and adaptable to any power source of appropriate size.

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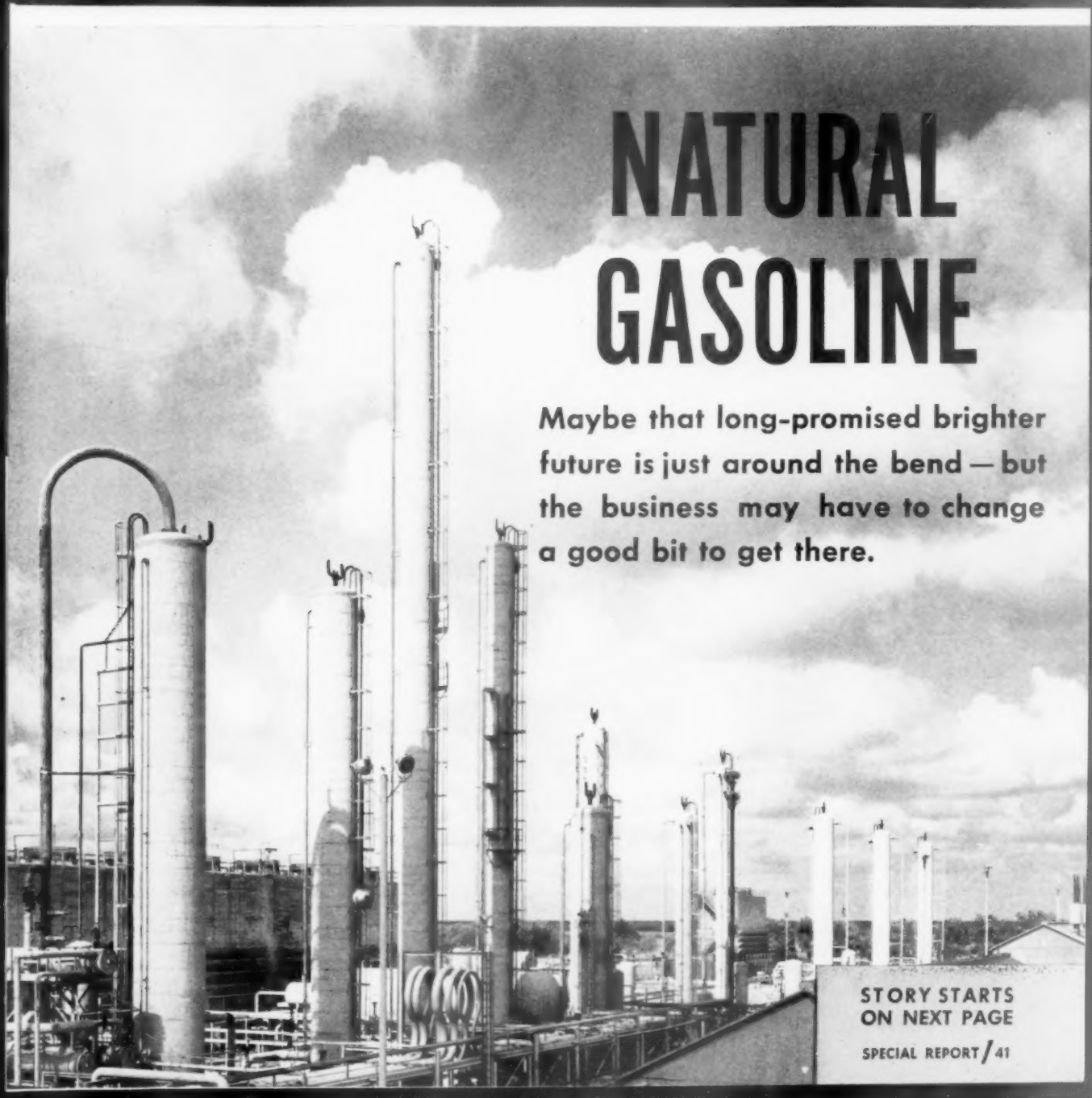

NATURAL GASOLINE

Maybe that long-promised brighter future is just around the bend — but the business may have to change a good bit to get there.

STORY STARTS ON NEXT PAGE

Natural Gasoline's 'Road Back' May Be

Q—Will demand for natural gasoline increase?

A—Yes—someday. Population will increase faster than oil reserves.

Q—Will the octane race slacken?

A—Very likely some day. Smaller cars with less horsepower are gaining favor.

Q—Will natural gasoline leave the motor fuels market?

A—Not likely soon. Talk of this sort is not backed by development of new markets.

Q—Can its octane be increased economically?

A—Yes—with the right feedstock, plant size, and process.

Q—Can petrochemical markets help natural gasoline sales?

A—Yes, a little. But the over-all market potential is too small to be a cure-all.

Q—What can gas liquids producers do to up profits?

A—LPG and butanes are riding high—he can squeeze more of these out of his gas.

Natural gasoline, after a long period in the business doldrums, may be coming back. Just how fast—and how far—it comes back will depend on some vital decisions now facing natural gasoline producers, and on related developments now taking shape in the oil industry as a whole.

You might say that natural gasoline producers' problems go back 20 years. It's been about that long that natural gasoline has been in a buyer's market. To make things even worse for the producers, it's a market where the largest buyers—the refiners—are becoming increasingly more important as suppliers of comparable components—the light naphthas from crude distillation, so called straight-run gasoline in the 90F-225F boiling range.

But things appear to be brightening.

Here are the findings of a just-completed PETROLEUM WEEK survey of producers of natural gas liquids—majors as well as large and small independents—on how their

Long, Hard, and Full of Surprises

problems now shape up, and—starting on page 44—on what solutions to these problems are in sight.

NG's Problem: Time Passed It By

Key problems facing natural gasoline producers today stem from Detroit's preoccupation with increasing horsepower. This preoccupation has resulted in the postwar gasoline octane race—and in the almost complete exit of natural gasoline as an important blending component in motor fuels.

For years, natural gasoline was a highly-valued product, used to increase the octane values of refinery gasolines into which they were blended. Today, however, you don't get any octane value out of natural gasoline—in fact, it's an octane-depressant.

Most of today's purchasers only want natural gasoline when there is enough low-grade-gasoline business to warrant its use. And with the supply-demand status of refined products as it is today, the volume of low-grade-gasoline business is greatly depressed.

Even the historical use of natural gasoline to increase motor fuel volatility is falling by the wayside. Today, refiners prefer to use the higher-octane byproducts from their own processing units—or butanes.

Refiners are increasingly reluctant to blend low-octane natural gasoline into expensive-to-produce high-octane motor fuels.

Adding strength to their resistance to the use of natural gasoline is an ever increasing flow of refinery "substitutes"—volatile byproducts from such processes as catalytic cracking and catalytic reforming. As one not-too-happy natural gasoline producer puts it, "With a cat cracker, a refiner can do without natural gasoline forever and a day. Today, every Gulf Coast refiner has excess butanes to blend into motor fuels."

The result is that markets and prices for natural gasoline are now spotty, with West Coast producers and fully-integrated oil companies faring best.

While many Mid-Continent independent producers of natural gasoline bemoan loss of markets, depressed prices, and general "lack of a home" for natural gasoline, their brothers in California have fared much better.

According to the California Natural Gasoline Assn., supply and demand for natural gasoline in California have been fairly stable—hence there are no particular problems facing the California natural gasoline producer.

In fact, the West Coast was a natural gasoline shortage area, as far as supply was concerned, until the last year or so.

But the California picture seems to be changing somewhat now. The present market for natural gasoline in California is growing soft.

A sellers' market existed in California until Jan. 16, 1958, when natural gasoline prices were cut around 10¢. This cut represented the first price change since Feb. 16, 1953.

The principal reason for this good market has been that many California crudes are very deficient in light ends. However, this advantage has also been offset somewhat by refiners' newer processess, which produce many of the volatile products formerly obtained almost exclusively from natural gasoline.

Another offsetting factor has been increasing use of imported crude.

Most integrated oil companies contacted say they have no particular problem in disposing of their own natural gasoline. Some say they manage to work the natural gasoline into their refinery processing scheme in some manner or other, while others—those with very large amounts of natural gasoline—have installed special octane-increasing processes for it.

Among independents, small natural gasoline producers have generally fewer complaints than the larger producers. Though they did some grumbling about depressed prices, many small producers are in a position similar to that of one in Texas who offers:

"We don't have a marketing problem. We only have one plant, which is located in West Texas. A pipeline runs by our front door, and we sell our sour, untreated natural gasoline to this pipeline twice a week."

A larger company, which produces over 500,000 gal. a day of natural gas liquids, agrees: "The small producers of natural gasoline are in better shape than the largest producers. They can get rid of small amounts easier than the big companies can get rid of larger amounts."

None of the company representatives contacted felt that the small producers were "in a squeeze." Failures and sellouts are no more numerous than they have been for many years.

It's got so that, in many cases, natural gasoline's failure to meet octane standards has pushed it into the position of being a "low-grade crude."

Natural gasoline can be acceptable as a blending stock for motor fuels limited to octane ratings of 95 or 96, ac-

continued

Natural Gas Liquids Reserves Where are they heading?

	Proved reserves at year's end (thousands of bbl.)	Increase over previous year
1948	3,540,783	286,808
1949	3,729,012	188,229
1950	4,267,663	538,651
1951	4,724,602	456,939
1952	4,996,651	272,049
1953	5,437,922	441,271
1954	**5,244,457**	**(—) 193,465**
1955	5,438,565	194,108
1956	5,902,332	463,767
1957	**5,687,360**	**(—) 214,972**

estimate, American Gas Assn.

cording to a spokesman for one major oil company. But that's not much of a market in this day of 100-plus "super" fuels, and premium gasolines pushing up to the 100 mark.

A few refiners are taking steps to improve natural gasoline for use in 97-plus octane number fuels by additional processing and the use of additives. But this added processing costs money which must be charged against the value of the basic natural gasoline.

It's now reached the point where, at its present value, natural gasoline is close to being ranked as a "crude-oil substitute," says a major natural gasoline producer. "It isn't much good as crude oil, and is much more difficult to process. But with crude costing 7½¢ per gal., and natural gasoline 4½¢ per gal., you can afford a higher processing cost for natural gasoline."

With nearly unanimous opinion that natural gasoline is rapidly losing its value as a refinery blending stock, a majority of the companies contacted by PETROLEUM WEEK feel that natural gasoline is becoming increasingly a "feedstock" for other processes, rather than a premium product in its own right.

Where Next? Five Possible Answers

There are at least five ways natural gasoline producers can turn in order to improve their position.

The direction each producer chooses will depend on his particular circumstances—and on developments in those segments of the oil industry most closely related to the natural gasoline business.

I. Build in Octanes

The basic approach that's getting the most consideration is that of making natural gasoline "more attractive" as a motor-fuel blending component by increasing its octane rating.

Making natural gasoline more attractive to manufacturers of motor fuels means but one thing to most companies—install a lot of refinery-type processing equipment.

Though several natural gasoline manufacturers have taken this path, with subsequent satisfaction, there is as yet no indication of a strong trend in this direction.

Still, most producers are considering such moves.

Two modern processes stand out as potential aids to natural gasoline producers who are eyeing the high-octane motor-fuels market—catalytic reforming and isomerization. Cat reforming of natural gasoline is here; isomerization is on the way.

There are over a dozen licensed catalytic reforming processes, which have been commercially proven in refinery operations, for upgrading the octane rating of naphtha cuts from crude. Some of these units have been used successfully in natural gasoline plants to process heptanes up through the 400F end point fraction.

Octane improvements of as much as 30 numbers have been reported from such operations. Two catalytic reforming processes in use by natural gasoline producers are Universal Oil Products Co.'s Platforming process, and Atlantic Refining Co.'s Catforming process.

It is possible that others among the stable of licensed catalytic reforming processes are being used by natural gasoline producers. But of the licensors contacted by PETROLEUM WEEK, only UOP and Atlantic made mention of actual commercial use in natural gasoline plants. But those companies that are reforming natural gasoline seem to be satisfied with the results.

Unfortunately, not all natural gasoline stocks are equally susceptible to upgrading by catalytic reforming. Each stock must be evaluated according to its own characteristics.

Isomerization, the making of high-octane "crooked" hydrocarbon molecules out of low-octane straight-chain hydrocarbon molecules, is an old process, with four relatively new members in its licensor family.

Licensed processes now available to natural gasoline and refinery operators alike include: Penex, licensed by Universal Oil Products Co.; Pentafining, licensed by Atlantic Refining Co.; Iso-Kel, licensed by M. W. Kellogg Co.; Isomerate, licensed by Pure Oil Co.; and Isomate (a wartime process made modern), licensed by Standard Oil Co. (Ind.).

These processes are aimed primarily at taking low-octane normal pentane and normal hexane and changing them into high-octane isopentane and isohexane. An average natural gasoline, containing an average amount of mixed (normal- and iso-) pentanes and hexanes, could expect an octane increase of at least 10 to 15 numbers via the isomerization route.

Use of these isomerization processes on pentanes, hexanes, or a mixed stream of pentanes and hexanes, can give an upgraded hydrocarbon stream, which can either be sold as such or reblended into the natural gasoline to make a higher-octane product for sale to refiners.

However, when selling isomerized pentanes and hexanes separately, the problem remains of how to dispose of the bottoms or residue from the natural gasoline.

Small natural gasoline producers feel that it is difficult to justify the cost of these modern, complex, octane-upgrading processes in their operations.

Several companies have installed catalytic reforming for natural gasoline feedstocks, and at least two have plans to install isomerization units. However, all of these units are reportedly well over 500 b/d capacity.

According to Atlantic Refining Co., 500 b/d is about the minimum economic size for a Catformer. Plant capacity would need to be in the order of 1,000 b/d of natural gasoline to support such a unit. Well over 100 natural gasoline plants in the country meet this capacity requirement—far more than those actually using a catalytic reforming process.

Although views on the economic justification of catalytic reforming vary, natural gasoline producers with small plant capacities are almost unanimously against expenditures of this kind. A representative opinion: "Process-wise, the small plant operator cannot afford to process

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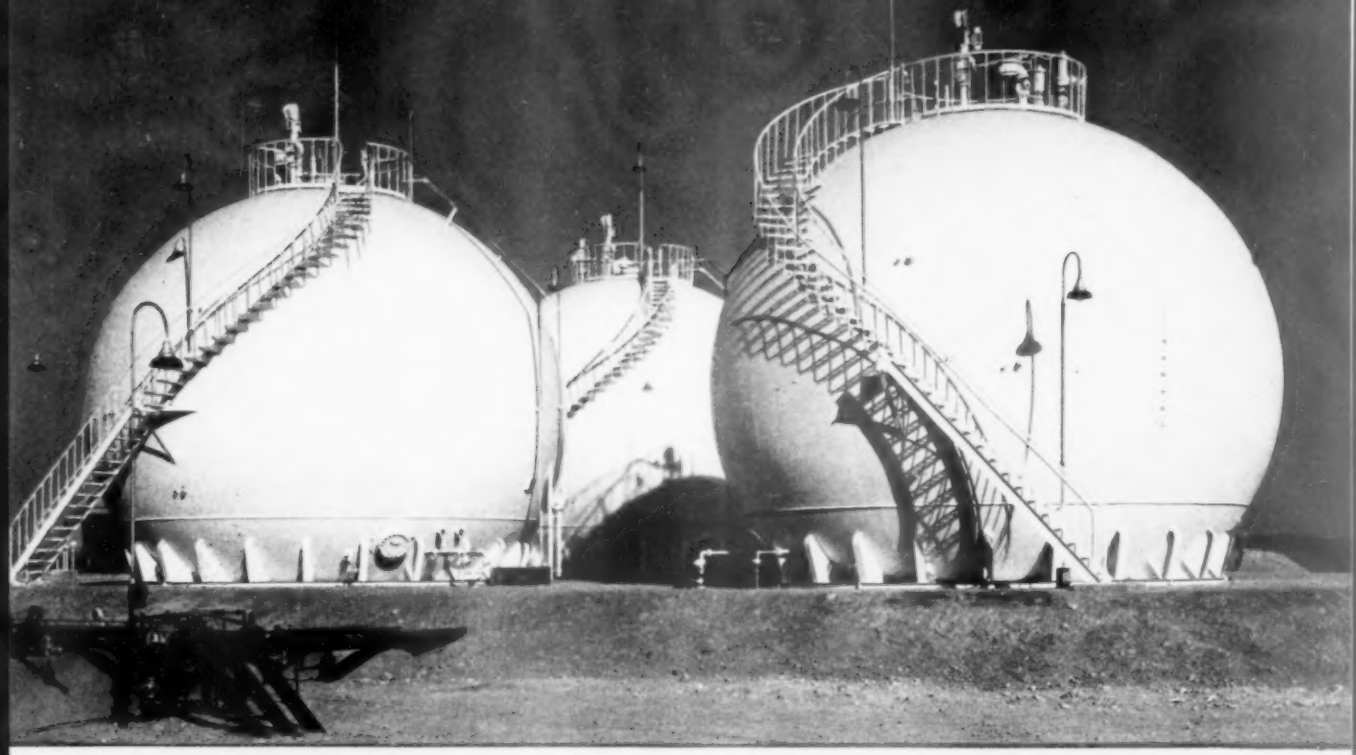

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Above: Three 3,500-bbl. Hortonspheroids, built by CB&I for the Texas Natural Gasoline Corporation, Perkin's Plant, Coke County, Texas. The structures are 35 ft. in diam. and were designed for a working pressure of 45 lbs. per sq. in.

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CRANE COUNTY, TEX.: This new maintenance plant helps Atlantic Refining Co. extract 2,500 b/d natural gas liquids.

basic natural gasoline to overcome this octane deficiency. Just any plant wouldn't have the output to justify the cost."

Or, as put by another, very small natural gasoline producer: "We let someone else handle this end. The refiner can upgrade the gasoline much cheaper."

At the other extreme, however, a spokesman for Standard Oil Co. of California said, "Isomerization is feasible to operate, and may be considered to be just on the horizon. Yields are good, but operating costs will be the key factor."

The licensors contend that these processes are not so expensive as many believe, and that they may well be the only way to make a profit from natural gasoline in the near future.

Universal Oil Products Co. has licensed several Platformers to natural gasoline plants. And two of its Penex isomerization units are now under construction for natural gasoline processing—one for Phillips Petroleum Co. in the Texas Panhandle, the other for Atlas Processing Co. in Shreveport, La.

Atlantic Refining Co. has several of its Catformers licensed to companies processing natural gasoline. Atlantic says that: in its opinion, the smallest practical size of Pentafiner isomerization unit is 500 b/d, same as for its Catforming process.

However, to have the quantity of normal pentane or normal hexane needed as feedstock for the Pentafining unit, the gas liquids recovery plant would have to be able to produce about 2,000 b/d of 12-lb. Reid vapor pressure natural gasoline.

Companies already having a pentane splitter at their natural gasoline plants have a head start on isomerization. Such feed-preparation facilities represent about two-thirds of the money needed for isomerization equipment to convert mixed pentanes to 95% high-octane isopentane.

Short-lived sources of supply for natural gas or casinghead gas, an "outside factor," could prove to be the main deterrent to any long-range investment in high-priced processing equipment for some producers.

As a third licensing company points out (one that has both catalytic reforming and isomerization processes to sell), there is an added complication in the depletion of gas or oil reserves from which natural gasoline is extracted (table, page 43).

Many natural gasoline producers feel that the potential life of their sources of supply too often are a good bit less than ten years, "hardly giving them an economic ground for investing much money."

However, all licensors contacted agree that such catalytic processes may be the only pay-out for the natural gasoline producer if octanes continue upward.

Future octane-building processes may also be an important factor in making natural gasoline "more attractive" as a blending component. "Heavy-ends" isomerization, for instance, could increase octane rating anywhere from 4 to 100 octane numbers.

Isomerization processes available today are not yet satisfactory for "heavy ends" of gasoline—those cuts heavier than pentanes and hexanes—because of the high percentage of degradation of the feedstock.

Pure heptane, for instance, with an octane number of zero, could be isomerized to triptane, with an octane number of 100. However, mixed heptanes, such as those found in natural gasoline, may already have an octane

number of 65 to 75. Isomerization of this material might only give a small octane boost, up to 70 to 75.

And such process developments are quite possible.
While no commercial process for isomerization of heavy ends has been announced, one major refiner, who is also a natural gasoline producer, feels that such a process may become available within the next five years.

Disproportionation—another means of increasing octanes of heavy hydrocarbons—might help the octane picture until such time as heavy-ends isomerization processes become available.
Disproportionation is a chemical reaction between a light isoparaffin (branched-chain) and a heavier normal paraffin (straight-chain), which gives a product containing a light normal paraffin and a heavier isoparaffin.
This reaction makes possible the production of higher-boiling isoparaffins having high octane numbers. To date, however, no commercial process utilizing this system has been announced.

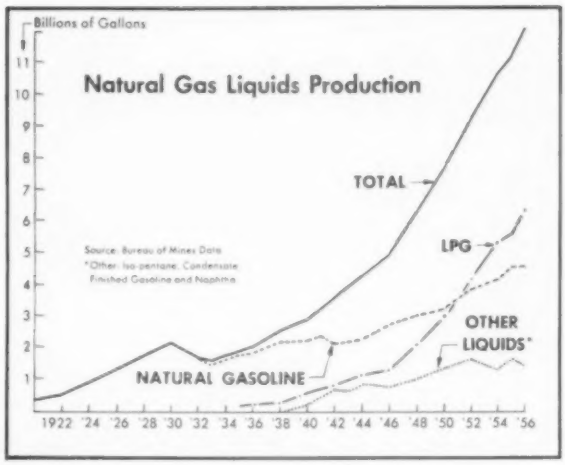
Atomic-radiation processing of hydrocarbons is being studied by numerous oil and other organizations. However, in spite of apparent potentialities, there is no indication that such processes are even "on the horizon."
Radiation procedures are being used to effect reactions of hydrocarbons that cannot be effected by other means. These procedures are being studied in relation to all types of light naphthas, including natural gasolines.
In general, the idea of radiation processing is to get enough energy from atomic particle radiation into hydrocarbon molecules to cause certain reactions to take place —without undesirable side reactions. Radiation in this case is not merely a source of heat; it acts primarily to "activate" the molecules into a controlled chemical reaction.

Other basic "work-horse" processes for handling a wide variety of feedstocks to produce a consistent-quality product are the goal of oil and chemical processors alike.
One major producer of natural gasoline, also a refiner of crude, told PETROLEUM WEEK that, while he feels technological advancements are coming slowly, the trend is to "get processes that will work on anything."
These will be processes able to take sweet crude, sour crude, natural gasoline, or all at once, and turn out a finished product.

II. Maintain the Status Quo

The direct alternative to building in additional octanes is to sit back and trust that a change in motor fuel characteristics and a tight crude supply will once more make natural gasoline highly desirable in its traditional markets.
This is not a strictly negative approach to the problem. If the motor-fuel blending pendulum swings back to emphasis on lower-octane, higher-volatility components—as a few barometers are now beginning to indicate—natural gasoline producers who resisted the temptation to upgrade their product will be in good shape.

And there is now some real basis for industry feelings that octane requirements will soon level off, and then begin a slow, prolonged descent.
A marked decrease in automobile octane requirements would be an almost automatic solution to many of the problems now plaguing the natural gasoline industry. While these octane levels probably will never drop to pre-World War II levels, a drop just 10 numbers would open the door for greatly increased use of natural gasoline in motor fuels.

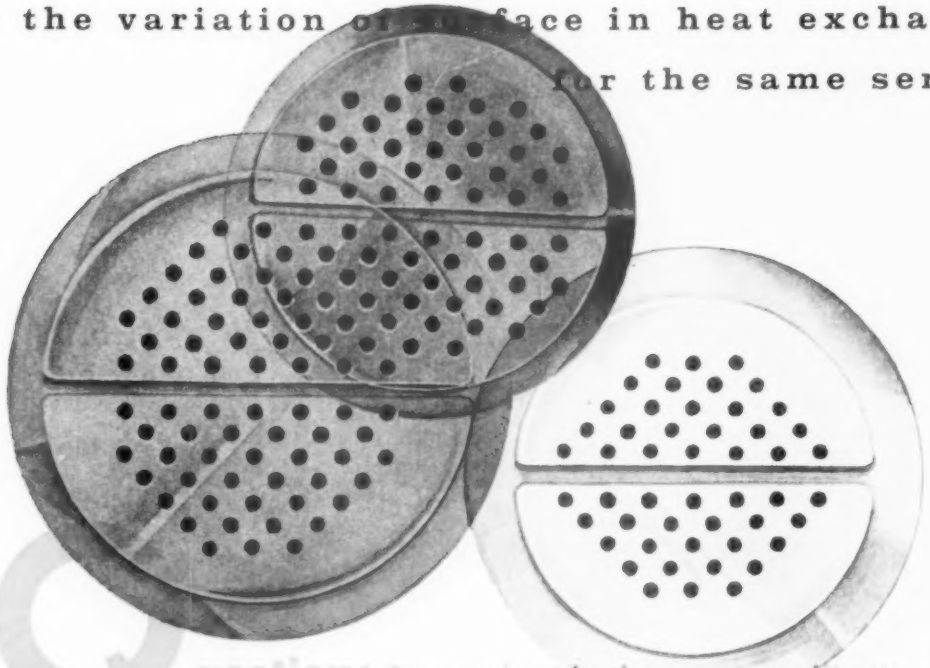

Billions of Gallons
Natural Gas Liquids Production
TOTAL
LPG
OTHER LIQUIDS*
NATURAL GASOLINE
Source: Bureau of Mines Data
*Other: Iso-pentane, Condensate, Finished Gasoline and Naphtha
1922 '24 '26 '28 '30 '32 '34 '36 '38 '40 '42 '44 '46 '48 '50 '52 '54 '56

While the Detroit car makers publicly pooh-pooh the impact of imported small cars, and give no credence to reports of growing customer resistance to the so-called "gas guzzlers" they produce, two of the major car makers reportedly are about ready to offer a U.S.-made small car to compete with imports.
Another possible sign of the times can be seen in auto production for the first few months of 1958, during which all domestic car makers registered severe declines in production (compared to 1957) except for American Motors with its short-wheel-base Rambler series.

The impact of the small European cars is already making a dent in gasoline demand in the United States, according to one large oil company.
These smaller cars are blamed as one of the reasons that oil and gasoline demand did not increase in 1957 (over 1956) as much as expected. "We just barely held our own in gasoline consumption," says an oil-company spokesman. "One big factor is that people today are buying cars that they cannot afford to run. These 'gas-guzzler' owners have reduced their driving by approximately 10%."
While a decrease in per capita consumption of gasoline is no help to the natural gasoline producer, he is helped by lowered octane requirements of the smaller cars and an increase in total miles driven by a rapidly growing population.

There is also the strong possibility that refiners may need more volatile fuels in the future. If so, natural gasoline would be able to reclaim a significant share of its old market.
While it hasn't begun yet, a trend toward automobile simplification could give a definite advantage. Present-day cars are so heavily loaded with "nontransportation" equipment, such as power windows, air-conditioners, and others—all of which generate heat under the hood—that

Why the variation of surface in heat exchangers for the same service?



Question: Presented with the same specifications, what justification is there to the variation of surfaces offered by a number of reputable suppliers of heat exchanger equipment, for a given service?

Answer: **Since heat transfer calculation to date is not an exact science, the data on which design curves are based may vary over a wide range, and EXPERIENCE is often the deciding factor, SO THAT . . . .**

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SPECIAL REPORT Natural Gasoline

the motor-fuel manufacturer is limited in the volatility of the gasoline he produces.

The natural gasoline industry has long tried to show the refiner the advantages of greater gasoline volatility via the use of more natural gasoline in motor fuels. But until engines are designed to accommodate this increased volatility, the discussion will remain academic. However, one spokesman for a major Mid-Continent oil company thinks that "future Reid vapor pressures for gasoline will go up."

More widespread use of fuel injection (to replace carburetion) would allow use of more volatile gasolines, and thus help the natural gasoline producer find increased sales.

Fuel injection is already being used rather widely in Europe, and as an optional item on several U. S. cars. But there is no present indication that the practice will become widespread in the near future.

A tight-crude-supply situation in the U. S., perhaps as early as the 1970s, would make almost any kind of a liquid hydrocarbon highly valuable in this country.

What happens to the oil industry as a whole will, in general, happen to natural gas liquids. By 1975, one major integrated oil company believes, "We'll be unable to produce hydrocarbons in this country in sufficient quantity to meet population demands. We will do well to hold the production rate we now have by the 1970s."

At the time the supply of crude starts to dwindle, costs will rise, and the natural gas liquids industry (as well as the whole production end of the business) will find it difficult to meet demand.

Productionwise, natural gasoline recovery won't grow very much, for the reason that it is becoming more difficult to find oil and gas. A decline in gas liquids recovered from both casinghead and natural gases can be anticipated (table, page 43).

Future natural gas liquids will tend to have fewer heavy ends, cause of much of the present marketing problem. The future prospects are more in favor of finding gas (giving a lighter gas liquid) than of finding oil, according to one oil company spokesman.

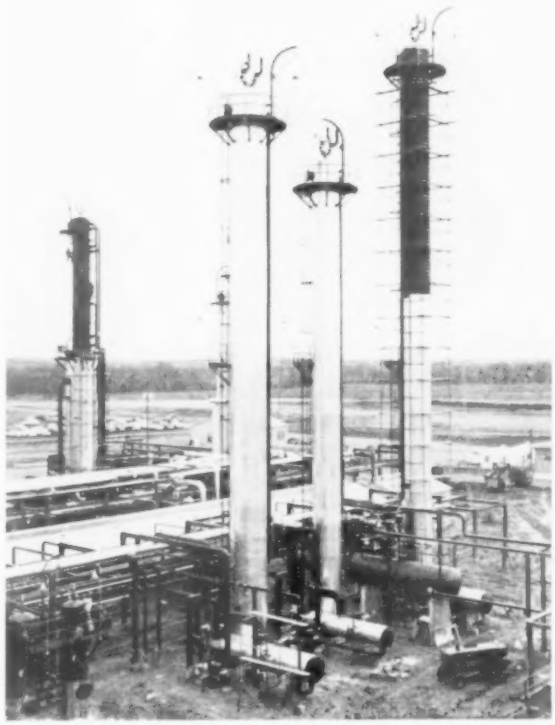
III. Develop New Markets

Heavier emphasis on new natural gasoline markets would also help producers. But even the brightest of these, the use of natural gasoline as a petrochemical feedstock, is "just another market" in the over-all natural gasoline consumption picture.

As a feedstock, natural gasoline does not have any particular advantage over any other hydrocarbon in the manufacture of petrochemicals. Using a very broad definition for the word petrochemicals, natural gasoline's primary advantage is found in cases where refiners fractionate to recover isopentanes and hexanes, using the residue for solvent naphthas and lacquer thinners.

Even if an overwhelming proportion of all petrochemicals were to be made from natural gasoline, it would amount to only about 3% of the total natural gasoline produced.

Natural gasoline has been tried as a petrochemical raw material, but most chemical plant operators feel that it is hard to work with, and they would rather have specific hydrocarbon cuts, such as butane, butylene, or propane.



WISE COUNTY, TEX.: This recently dedicated facility of Wiseco Processing Plant, Inc., can produce 3,700 b/d.

Price, and location with respect to petrochemical plants, will have major effects on any future push to use natural gasoline to make chemicals.

Premium prices for natural gasoline sold to the petrochemical industry are unlikely. Petrochemical plants are being designed for an increasing degree of flexibility, to allow more interchangeability of feedstocks. This will mean that relative values for all possible feedstocks will be fixed, so that if the price of natural gasoline were to rise, the petrochemical plants could switch to another raw material.

The refiners, who buy the great bulk of the natural gasoline, set the price of natural gasoline on a competitive market. This brings the problem down to balancing the petrochemical plant—a very small user—against the refiner—the major user.

According to one natural gasoline producer, some petrochemical companies in the past purchased natural gasoline in large quantities, over a long period of time, at costs that proved to be too high. They were "burned so badly on the deal" that it isn't likely that they will make large purchases of natural gasoline in the future. This company, like most others interviewed by PETROLEUM WEEK, sees "no great future for natural gasoline in the petrochemical industry."

In specific cases, a favorable location could influence the use of natural gasoline as a petrochemical feedstock.

continued ▶

SPECIAL REPORT / Natural Gasoline

If the petrochemical plant were located near enough to the natural gasoline plant so that freight charges wouldn't eat up all the profits, it might make the grade as a supplier of petrochemical raw materials.

Fractionation of natural gasoline into pure cuts to serve as petrochemical raw materials could enhance its use-value to chemical plants—but only for those able to afford the fractionation equipment.

Hydrocarbons in natural gasoline from the C_4 compounds (butanes) through the C_8 or C_9 compounds (octanes and nonanes) could make excellent feedstocks for many chemical plants.

However, the small operator has trouble merely in splitting the pentane family of hydrocarbons; he would find it prohibitive to split the entire natural gasoline fraction into its constituent parts. Equipment for such superfractionation of difficult-to-separate compounds is complex and expensive.

In many cases, the operator would get no more than a few cupsful a day of some of the compounds to be found in natural gasoline. To top it all, he then would have to seek specialty markets, thus requiring a broad-based sales organization, covering many specialized fields, over a large portion of the nation or the world.

One possible solution would be for several small producers to pool their output into a jointly-owned, central fractionation plant, to insure an economically large input to the fractionator.

IV. Improve Recovery Processes

Another possible avenue for natural gasoline producers is development of new recovery processes. But such development now appears to be unlikely, mainly because of the general satisfaction with today's recovery plants.

Of the 114 gas liquids recovery plants represented in the PETROLEUM WEEK survey, an overwhelming majority use the time-proven and conventional "oil absorption" method. Refrigeration recovery is used in a few of the smaller plants.

General sentiment is pretty well expressed by one company spokesman, who said, "The boys are doing a good job on recovery of natural gasoline. We don't have any problems there. All we have left over is some propane.

"However, LPG recovery is considered a problem, and will require more elaborate facilities as recovery plants go into this more heavily."

Actually, the natural gasoline manufacturer has several basic process variations he can use in designing recovery facilities for his plant. The method finally chosen depends upon many factors: fuel requirements, volume of liquids produced, liquid content of the inlet gas, operating pressure, and many others.

While all methods have their peculiarities, nothing really new has been developed in this area for a number of years.

Yet, while going on record as being fairly well satisfied with conventional recovery methods, natural gasoline producers complain that operating costs have risen rapidly, due both to inflationary pressures and to operation of plants at less than capacity because of crude proration. They also complain that, during this time of rising costs, the value of natural gasoline has dropped drastically.

But there is active interest in technical circles in devising methods and equipment to improve the efficiency of gas-liquids recovery.

At meetings of the Natural Gasoline Assn. of America, for instance, numerous papers and discussions are devoted to the subjects of gas chromotography and improved instrumentation as means for better plant operation and control. Even more efficient and economical maintenance procedures come under discussion.

V. Produce More LPG

Natural gasoline producers have still another choice: greater concentration on their "more valuable" products —such as LPG now, and ethane a little down the road— in addition to natural gasoline.

Times are as good in the LPG market as they are bad in the natural gasoline market, and an increasing number of producers are going over to heavier LPG production.

LPG, mainly butanes and propanes, can be made by squeezing a few more of the liquids out of natural gas during recovery of natural gasoline. It has such a high value today that it can carry the costs of many natural gasoline plants. And this is in the face of fluctuating and seasonal markets, large off-season storage requirements, and increasing transportation costs and distances in today's market.

With certain plant-design modifications, the natural gas liquids producer of tomorrow might find himself a lucrative market for ethane in the manufacture of polyethylene and other ethane- and ethylene-derived petrochemicals.

While only small plant modifications usually are needed for significantly greater production of LPG, ethane is a different problem. Ethane recovery facilities are much more elaborate, and operating conditions much more severe, than for LPG recovery. A greater amount of mechanical refrigeration will be needed to give the low temperatures required to liquefy the normally gaseous ethane.

Rather than make major modifications to existing plants, a more likely possibility is an evolution in the design of newer gas liquids recovery plants to allow for ethane recovery in the most economical manner.

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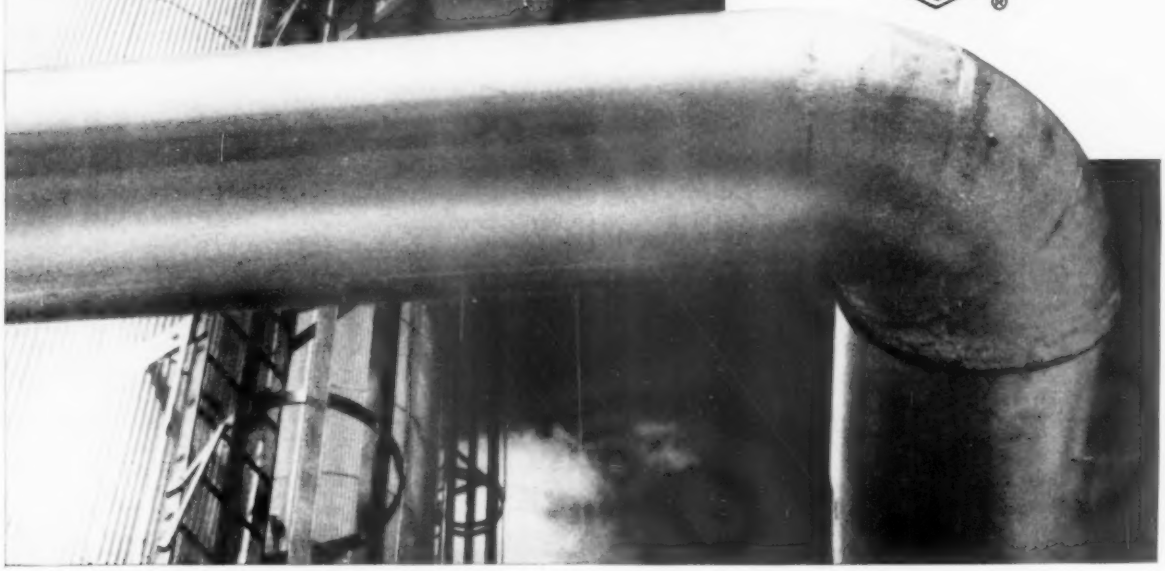

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Iran's Qum Oil Prospects Still Unclear

A new well was spudded in central Iran last week in another effort to prove the oil potential in the Qum area, where the spectacular No. 5 Alborz blew out in 1955.

The new test is No. 5A Alborz, a replacement well 820 ft. from the No. 5. In 1955, that well nicked the top of the reservoir at about 8,700 ft. and blew wild for three months, at a rate estimated at between 80,000 b/d and 100,000 b/d, before it was successfully controlled.

The Alborz structure is about 75 mi. southwest of Teheran, in an area being explored exclusively by Iran Oil Co., a subsidiary of National Iranian Oil Co.

Drilling results on the Alborz structure so far have not confirmed the high promise of the No. 5 well.

Iran Oil Co. so far has drilled only two stepout wells since the No. 5 Alborz was finally killed. Both have been disappointing.

The No. 6 Alborz was spudded a year ago, 1½ mi. west of No. 5. It hit salt water, encountering only traces of oil in a limestone core, though it was carried well below the 8,700 ft. level at which No. 5 hit the top of the structure. The well is now being abandoned around 10,800 ft. After a two-month fishing job.

The No. 7 Alborz was spudded last October, and has encountered solid salt. This well also is now below 10,000 ft. since drilling was resumed in March after a one-month fishing job.

Iran Oil Co. meanwhile is extending its drilling operations to other areas, with its first wildcat to be spudded next week on the Saradjeh structure, 30 mi. south-southeast of Alborz.

Saradjeh and Alborz are both large anticlines that were recognized in 1950, when the decision was made to drill at Alborz first.

The company is also reported as preparing to drill what may be the first new well in years at the old Naft-i-Shah field near the Iraq border, southwest of Alborz. This field, which went into production in 1935, was taken over by NIOC in 1951, and has been producing an estimated 3,500 b/d from two wells. Four other wells drilled there before NIOC took over were not successful.

Extension of drilling into these areas now appears to indicate that Iran's high hopes for Qum have already been considerably dampened. Iran Oil is, however, planning to step up operations at Qum, while talks with Turkey have now been resumed in Teheran on long-range plans for a pipeline outlet through Turkey to the Mediterranean (PW—Oct.11'57,p82).

The No. 5A Alborz spudded last week is the first to be drilled for Iran Oil by Seacat Drilling Co., a new U.S.-Lebanese contractor that's now launching operations in the Middle East (PW—Oct.25'57,p6).

The company, formed last year, is supplying two Oilwell 96 rigs under its two-year contract with Iran Oil. It is prepared to drill at least four wells a year, ranging from 10,000 ft. to 14,000 ft., though apparently no definite program has yet been decided upon.

Seacat is owned 50% by two Texas-based drilling contractors, and 50% by Contracting & Trading Co. (CAT), of Beirut.

The U.S. partners in the venture are Southeastern Drilling Corp., Dallas, and Turnbull & Zoch, Corpus Christi.

Representing CAT in the new Seacat Drilling Co. is George Heseldin, retired general manager of Iraq Petroleum Co.'s operations in the Persian Gulf.

The two U.S. contractors are also operating in India and Pakistan, through their jointly-owned Southeastern Asia Drilling Co.

That company has so far completed six wells in Pakistan, where it has two rigs operating, one each for Standard-Vacuum Oil Co. and Shell Oil Co. In India, four wells have been completed under a one-rig contract with Stanvac.

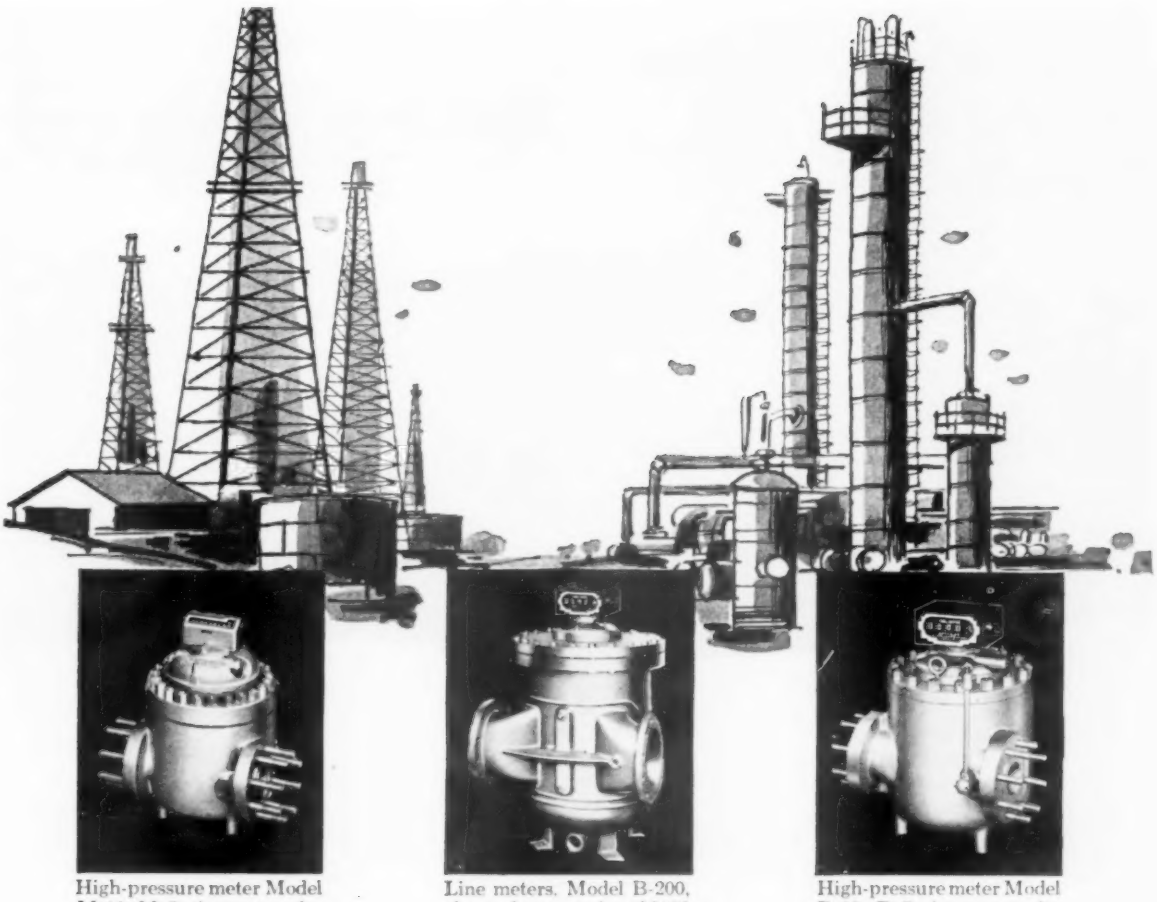
Besides its two-rig contract in Iran, Seacat expects additional Middle East assignments, and is planning on operating five rigs in the area this year.

Since even major oil companies are now letting contracts for some of their drilling, the area looks promising to Seacat. Like other contractors, it is also eyeing Libya, where exploratory drilling has been speeding up lately (PW—Feb.14'58,p56).

Britain Gets First Nigerian Crude

The first crude from Nigeria to reach the United Kingdom was unloaded last week at Queen's Dock, Swansea, the oil port for British Petroleum's Llandarcy refinery.

Several Nigerian officials were on hand as BP's "Clyde Crusader" discharged its 7,000-ton cargo. This is the second shipment of Nigerian oil to reach Europe. The first was shipped to the Netherlands for testing in Shell's Pernis refinery (PW—Mar.7'58,p66).



High-pressure meter Model M-12. M Series meters for working pressures up to 1200 psi, 120 gpm.

Line meters. Model B-200, shown, has capacity of 3000 bbl/hr. New Model B-700 — 10,000 bbl/hr.

High-pressure meter Model D-35. D-Series meters for working pressures up to 600 psi, capacity 350 gpm.

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. . . HOW WE WORK STEEL TO MAKE STEEL WORK FOR YOU

Japan Boosts Oil Import Budget

TOKYO—With Japan's oil demand continuing its fast upward climb, the allocation for oil imports was the only item increased in Japan's foreign exchange budget for April-September, though the foreign exchange crisis is not yet completely ended.

The Finance Ministry allotted a whopping $145,306,000 for oil imports in the first half of the 1958 fiscal year—almost 10% of its total foreign exchange budget.

Petroleum imports accounted for only 6% of the total foreign exchange bill in fiscal 1957, when oil purchases were rigidly cut back due to a severe foreign exchange crisis.

Low inventories of most products are one reason for the increased allotment, while the budding petrochemical industry puts still more push behind Japan's dramatically increasing oil demand. Consumption has tripled in the past five years, to some 240,000 b/d in 1957, and is expected to climb to 320,000 b/d this year.

Biggest item in the new six-month oil allocation covers 64.8-million bbl. of crude and products, for a total of $129.6-million.

An additional $11.4-million is allocated for 3.6-million bbl. of fuel oil. This is not the total for fuel oil, but rather a separate allocation for importers who bring in fuel oil alone.

Another $3.1-million is set aside for petroleum coke, and $1.2-million for "waste oil" (used crank-case oil).

The over-all exchange budget also includes $1-million to $2-million for imports of Soviet crude, plus a $300,000 subsidiary for refiners and traders who will handle the Russian oil (PW—Apr.4'58,p41).

Refiners may get a maximum 40% subsidiary for Soviet oil, which the government is interested in having imported to balance a trade surplus. The subsidy will be applicable only to purchases of other Russian goods.

Oil importers will be subjected to increasing government pressure to switch from dollar to sterling oil, according to hints from Finance Ministry sources.

Japan's payments balance has been running heavily against the whole sterling area since last December.

Government budgeters now estimate that Japan will accumulate $120-million worth of sterling during the first half of fiscal 1958.

For this reason, government planners are expected to fight for a change in last year's trend in oil purchases, which were 70% dollar oil, 30 sterling.

Two Getty Firms Enter Pakistan

Two Getty-controlled companies and a Philadelphia independent have joined the oil hunt in Pakistan.

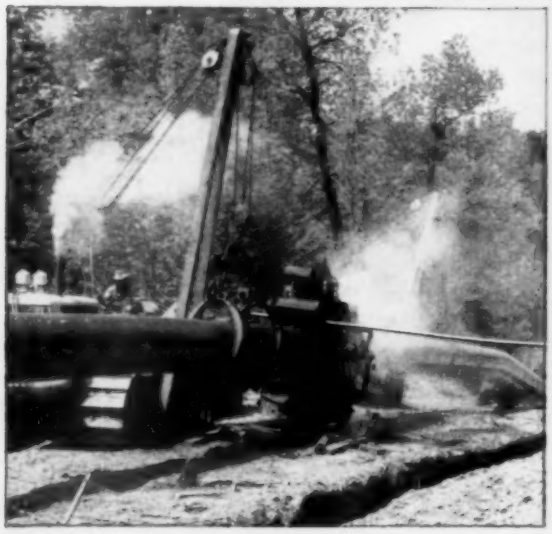
Tidewater Oil Co. announced last week that it had been granted concessions in West Pakistan. The agreement covers two areas totaling about 10,000 sq. mi.

The government of Pakistan holds a 25% working interest in the venture, assuming a proportionate share of the risk. This is comparable to most other concession agreements in Pakistan.

Under Pakistani law, production royalties and taxes paid the government amount to 50% of the venture's profit.

Skelly Oil Co. and Kewanee Oil Co. are equal partners with Tide-

A. O. Smith products for



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The above photo shows a collapsed specimen of 9⅝" S-95 casing being removed from the testing well. The high collapse value of A. O. Smith casing has been maintained by a continuous program of research and testing. As a result of this program, S-95 casing has gained wide acceptance for use in deep wells.

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water in the venture. Tidewater, however, will serve as operator on the concession.

This is apparently the first overseas move for Skelly, which, like Tidewater, is controlled by J. Paul Getty interests. Getty also owns a one-half interest in the Kuwait-Saudi Arabia Neutral Zone.

The Philadelphia-based Kewanee has some properties in Cuba, as well as in the U.S.

Pakistan is the fifth foreign country in which Tidewater is currently participating. It has interests in Canada, Guatemala, Turkey, and Iran.

The newcomers are the seventh concessionaires to join the oil search. Companies already there include Standard-Vacuum Oil, Hunt International, Sun Oil, Attock Oil, Burmah Oil, and Shell.

Although exploration was active, no new oil discoveries were made last year. Some 5,800 b/d of crude came from four small fields in Punjab, West Pakistan.

Major gas deposits have been found, with production in the Sui field of West Pakistan climbing to over 10.2-billion cu. ft. last year. Another substantial gas field was recently discovered by Sylhet, East Pakistan.

What's New / AROUND THE WORLD

Oil Reserves Jump 10%

VENEZUELA—The net increase in Venezuela's oil reserves last year is placed at 1.3-billion bbl. by the Ministry of Mines & Hydrocarbons.

According to the ministry's preliminary estimates, new reserves discovered last year totaled 2.3-billion bbl. Total reserves, according to the Ministry, were 15-billion bbl. at year's end.

The net increase in reserves during the year amounts to nearly 10%.

•

GUATEMALA—A new Dallas-based company has acquired a 1-million-acre concession in Guatemala as its first step into Latin American oil exploration.

The tract was granted to Texas Northern Petroleum Co., Inc., according to James E. Malone, of Dallas, executive vice-president of the company. The acreage is centered in the departments of El Quiche and Huehuetenango, about 75 mi. northwest of Guatemala City. Malone said exploration plans for the tract have not been formulated beyond the point of initial surveys.

Meanwhile, the company is in process of filing applications for oil rights in Costa Rica, Nicaragua, and Colombia, according to Malone, who is also president of Metal Crafts Products Co., Dallas.

Also associated in the venture as a director of the company is Jerry Wales, of Dallas, president of Trans-Tex Steel Co. All other officers are Guatemalan nationals, Malone said.

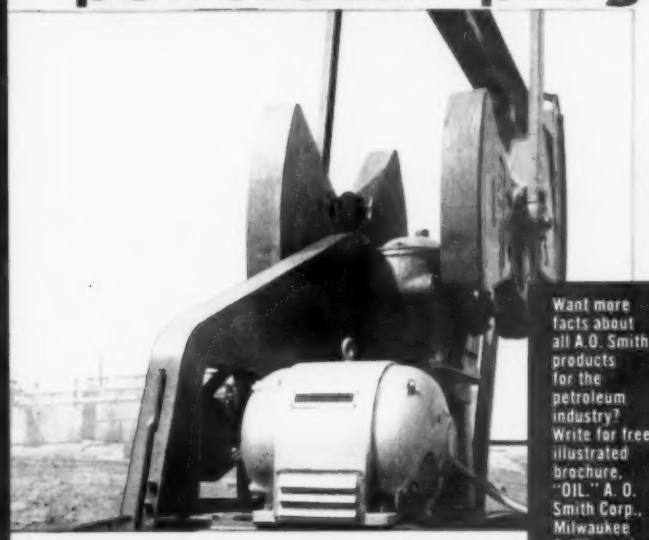
•

ITALY—Small independent refiners are having tough going to maintain a spot in Italy's tightening oil market.

A sign of the times: Petroli d'Italia has been losing at the rate of $6.16 per ton of crude refined at its 3,200 b/d plant at Piacenza.

The company, whose total capitalization is $880,000, has now filed for

petroleum progress



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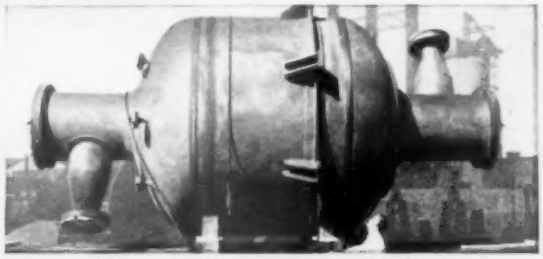

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deferred debts payment after declaring a $1.4-million loss.

•

INDIA—Rumania is reported prepared to provide the Indian government with $18.9-million in equipment and technical assistance for one of its two projected refineries.

A preliminary agreement on Communist aid in building a 20,000 b/d refinery in Assam was reached in New Delhi last month, during the state visit of Rumanian Prime Minister Chivu Stoica.

India's Minister for Mines & Fuel now expects to lead an Indian delegation to Bucharest to finalize details of the agreement, which would cover just over half the $31.5-million cost of the Assam plant.

Ministry officials say the Soviet Union also has offered aid, in setting up the Indian government's 30,000 b/d refinery in Bihar. This offer has yet to be discussed in specific terms, however.

Both plants would process crude from the new field in the northeastern state of Assam. These are to be developed by the newly formed Oil India Private, owned ⅔ by the British-owned Assam Oil Co. and ⅓ by the government.

Meanwhile, Pipeline Engineering Co., of Dallas, has submitted its survey report on the projected pipeline to feed the refineries. It estimates that the line will cost $50-million.

•

EGYPT—The government says a new 7,000 b/d well has been brought in at the new Abu Rhodeis field, on the west coast of Sinai.

No details were given on the well in the announcement last week by Minister of Industry Aziz Sidki.

The well, drilled by Cie. Orientale des Petroles d'Egypte, is the third, and apparently the biggest, in the field. The two others are said to be producing 2,000 b/d and 3,000 b/d respectively.

Egypt owns 49% interest in Cie. Orientale, with the other 51% held by International Egyptian Oil Co., a company controlled by Petrofina and Italy's Ente Nazionale Idrocarburi.

•

ARGENTINA—The tiny sheikhdom of Kuwait supplied 32% of Argentina's 1957 crude oil imports, while 14.5% of its fuel oil purchases came from other Persian Gulf areas.

According to Argentine customs declarations, total oil imports last year were some 170,000 b/d, of which 45% came from Venezuela.

More than 90% of the 114,000 b/d of crude imports came from Venezuela (74,000 b/d) and Kuwait (30,600 b/d).

About 71% of the 38,000 b/d of fuel oil imports came from the Dutch Antilles (27,000 b/d); 15% from the Middle East (5,800 b/d); 11% from the U.S. (4,200 b/d); and the rest from Venezuela.

•

ISRAEL—The long-projected sale of the joint Shell-British Petroleum marketing properties has been effected for less than book value.

The sale is understood to have involved less than $11-million, about $1-million below the book value of the assets of Shell Co. of Palestine.

Purchasor was Iwol Investments, a newly formed investment company headed by British industrialist Isaac Wolfson, a long-time patron of health and educational programs in Israel.

Shell Palestine handled about 40% of the 26,000 b/d of Israel's oil product consumption last year.

No decision has yet been reached on the Shell-BP refinery at Haifa, which has been operating at 20% of its 80,000 b/d capacity.

•

PUERTO RICO—A Houston oil man has acquired oil and gas rights on more than 200,000 acres on the southern coast of this island. David L. Gordon, president of Martime Oil Co., negotiated the agreement.

Gordan has the right to transfer the permit rights to Maritime Oil Co. or to a company to be organized to develop the property.

The grant includes an exploration permit and lease-selection option covering the land and offshore area.

•

JAPAN—A LeTourneau offshore mobile drilling platform will be used on Japan's first offshore test this September.

Oil Resources Depelopment Co., controlled by the government, has signed a contract with the Texas firm for a $1.7-million platform. The Japanese company plans to drill one or two tests to about 5,000 ft. The location is about 1½ mi. out in the Japan Sea, off Michikawa, in Honshu's Akita Prefecture. The company conducted seismic surveys there in 1956-57. Some equipment will be purchased domestically. Upon Japanese government approval, American equipment will be delivered by the end of June.

Comeback for Pipeline Radioisotopes?

After a decade of indifference, pipeliners have recently shown renewed interest in radioactive materials. But will this interest last—and develop?

The radioisotope, a neglected longtime friend of pipeliners, is showing signs of becoming more useful in both pipeline operations and research.

Pipeliners were among the first industrial users of radioactive materials. As early as 1948, several major companies were using radioactive tracers to mark product interfaces in pipelines.

Since then, the Atomic Energy Commission, which licenses industrial applications of radioactive materials, has approved many requests from pipeliners for use of such materials in a wide variety of applications on both research and operating levels.

But, mostly because of the cost and "bother" involved, many pipeline companies licensed to use radioisotopes have not done so, and such use is now far from general.

A few recent developments, however, may reawaken pipeliners' interest in radioisotopes:

In Salt Lake Pipe Line Co.'s products system, for instance, radioactive material in the product stream automatically operates controls at remote pumping stations.

Here's how the system works:

A radioactive tracer solution is injected into the line at the point where the products enter it. Detecting equipment, consisting of Geiger tubes or a "scintillation detector," is connected to a ratemeter and recorder and installed on the line upstream from the automatic pumping station.

The detectors intercept the gamma rays emitted by the radioisotope interface as it passes the sensing point and cause the pump station to make necessary adjustments for handling the oncoming product.

Radioisotopes in the Salt Lake products system are also used to alert the line's terminal operator when a new product is arriving.

Radioactive tracers are also getting increased consideration for use in leak detection and location of obstacles in a line.

The problem of locating obstacles in lines has been given special attention. Tracerlab, Inc., of Boston, has developed a special method of using radioactivity for locating stuck go-devils (scrapers) in lines.

The method is to mark such scraping devices with radioactive cobalt-60.

When the go-devil gets stuck, a portable Geiger counter can easily find it by detecting the location of the cobalt-60. This method is said to be effective with up to 5 ft. of dirt over the pipe.

Pipeline research projects may also bank more heavily on radioisotopes—as two recent studies of pipe corrosion problems did.

California Research Corp. made use of radioactive materials in investigating corrosion problems on the recently-completed American Gilsonite Co. pipeline between Bonanza, Utah, and Grand Junction, Colo. (PW—Aug.2 '57,p36).

Cal Research engineers used a small section of radioactive pipe installed in a test loop to find out how corrosive the gilsonite slurry would be.

Corrosion measures were made by dipping a 1 x 12-in. Geiger tube into a jar containing 1 gal. of slurry drained from the line. Radioactive iron that had corroded from the specimen pipe was suspended or dissolved in the solution, and could be measured.

The first of such tests showed an unexpectedly high rate of corrosion. But the radioactive method of investigation quickly pointed out both the cause and a solution, and the tests were completed within only a few days.

Cal Research says that no unusual safety problems were encountered during the tests.

Humble Pipe Line Co. last year also used radioactive tracers to study corrosion problems in pipelines.

Humble's study, however, was lim-

Four Corners Line Is Completed

The final finishing touches—backfilling and right of way cleanup—were applied near the western end of the Four Corners-to-Los Angeles crude line recently in preparation for initial deliveries which are being made this week.

The line is delivering about 53,000 b/d —33,000 b/d from Utah and 20,000 b/d from northwestern New Mexico—and is expected to be moving 60,000 b/d by mid-year.

Most of the crude will be used at Los Angeles refineries of companies owning the line; some, however, will be shipped northward to Shell Oil Co.'s Anacortes (Wash.) refinery.

The line was begun last summer (PW —Aug.23'57,p32).

ited to the use of inhibitors in lines carrying corrosive crudes.

Radioactive carbon-14 was incorporated into the chemical structure of inhibitors, and the rates of absorption and desorption of inhibitor films on metal surfaces were measured.

The results of these tests will have an important bearing on the way Humble uses inhibitors in the future.

Other pipeline research projects might also benefit from using radioactive materials.

In the past, radioisotopes have been used with success in research to determine flow rates, and in studies of degree of mixing of adjacent fluid components. These and other research areas may well make use of radioisotopes general again—if pipeliners can be reconvinced that such materials are again worth their cost and "bother."

New Pipeliners' Tool: Drill Rigs

Pipeline cathodic protection is sinking deeper into the earth's crust these days—and drilling rigs are helping it reach the new depths.

In cathodic protection, pipe corrosion is prevented by neutralizing the corroding flow of electric current from spots of bare pipe to the ground.

This neutralization is accomplished by sinking "groundbeds"—usually carbon rod anodes—into the ground along the pipeline right of way. The groundbeds get current from a nearby power line through a rectifier and pass it through the ground to the pipeline. The current then rebounds to the groundbed, which bears the brunt of its corrosive action.

Normal groundbeds—5 ft. long, and installed at depths of from 5 to 20 ft.—can't handle the cathodic protection job in many areas of high-resistance soil. In such areas, deep groundbeds, which go down as far as 300 ft., are getting the call.

Deep groundbeds are also needed in some areas where multiple lines exist, and where long groundbed rights of way are hard to get.

Interstate Oil Pipe Line Co. is one firm that has been doing a lot of work with deep groundbeds in such areas—although it was not the first company to use them.

Interstate's first deep groundbed was made up of 300 ft. of 4½-in. OD. drill pipe. Life expectancy for this grounded is only four years.

Now, however, Interstate says it has developed a deep groundbed that will give highly satisfactory performance for more than 20 years. The groundbed is a combination of a carbon rod and junk casing. It consists of 240 ft. of 85/8-in. OD. casing around 200 ft. of 3-in-diameter carbon rod with a coke breeze backfill.

Interstate says that this latest groundbed will be its standard groundbed for future deep cathodic protection projects.

In order to get the deep groundbeds down to where they'll do the most good, Interstate has been drilling with specially-adapted rigs.

The rather strange sight of drilling rigs on pipelines will become more common as deep groundbeds receive increasing acceptance.

Interstate has just completed installation of such groundbeds on trunklines in its Brookhaven (Miss.) and Raceland (La.) districts. And the company intends to install more deep grounds later this year.

IOPL engineers are also scheduled to report on their success with deep groundbeds at the fall meeting of the American Society of Mechanical Engineers.

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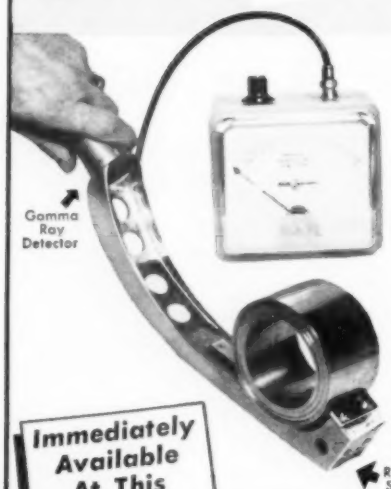

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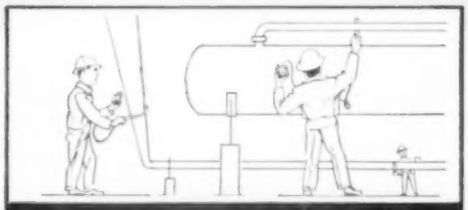

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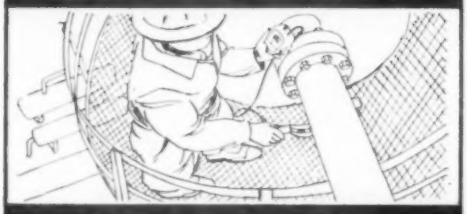

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What's New / IN TRANSPORTATION

Still No New Tanker Orders in U.S. Yards

For the fifth consecutive month, no new tanker orders were placed in American shipyards in March.

Here's how the current U.S. tanker-building pattern grew up:

In early 1957, in the wake of the Suez crisis, tanker orders at U.S. shipyards were at their all-time peak—over 100 tankers, valued at $1.1-billion, were on order in this country.

In the last six months of 1957, 25 new tankers, with an estimated value of $130-million, were turned out by U.S. yards.

In addition, the prolonged drop in tanker rates has since caused cancellation of orders for 13 of the remaining tankers (PW—Jan.24'57,p44), further reducing the number of tankers on order in U.S. yards to the current number—72.

All of the tanker cancellations were made by the Greek shipping magnates. So far, no major oil company has canceled any tanker orders.

Shipbuilders don't expect any more cancellations. But they don't expect any rush of new business, either.

•

Cosden Extends Line

Cosden Petroleum Corp. refineries have just been linked with the Wichita Falls market in North Texas.

Formerly Cosden's 6-in. carrier moved products from the company's Big Spring and Colorado City plants only as far as Abilene, delivering jet fuel at two air bases along the way. Late last month Trust Pipeline Co., owned by the Cosden trustee, put into service the Abilene-Wichita Falls extension and a new 180,000 bbl. product storage center at Wichita Falls.

•

Large digital computers may soon be playing an important role in running pipelines.

Dr. H. R. J. Grosch, of International Business Machines Corp., told the American Petroleum Institute pipeline conference last week that digital computers can provide "mathematical models" on which problems of operation, scheduling, and economics can be worked out by pipeliners.

Although no pipeline company is known to be using a digital computer in such a way, Dr. Grosch says that several are considering such use very carefully.

•

El Paso Natural Gas Co.'s $138-million expansion plan has been approved by the Federal Power Commission.

The expansion will enable El Paso to supply 185-million cu. ft. of gas daily to customers in Arizona and California.

The FPC approval covers construction of 216 mi. of trunk line, 58,900 hp. in compressor capacity, and field facilities consisting of 533 mi. of line and 27,850 compressor hp. in Texas, Arizona, and New Mexico.

•

Brown & Root, Inc., will lay the largest diameter pipeline in the world for Creole Petroleum Corp.'s Lake Maracaibo gathering system. The 40-in. pipe will have an over-all diameter of 52 in. after reinforcing and coating.

About 13 mi. of the big inch line will be laid in the Lake. Each 40-ft. joint of the mammoth pipe will weigh about 20 tons.

Special Brown & Root processing yards will apply over 1-million lb. of reinforcing material to the pipe before it is laid. The largest pipe shot-blast machine ever built will clean the pipe before the concrete coating is applied.

•

A subsidiary of Home Oil Co. intends to build a 125-mi., 10¾-in. crude line from Swan Hills, Alberta, to Edmonton.

Initial capacity of the $6.5-million line will be about 30,000 b/d. Federation Pipelines, Ltd., the company building the line, is expected to apply to the Alberta Minister of Mines & Minerals next week for a construction permit.

•

Idle tanker tonnage in British ports totalled 275,308 tons last month, according to the United Kingdom Chamber of Shipping. A few of the tankers are laid up for repairs, but most are out of use because of the continued slump in the tanker market.

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New Process Cuts Catalyst Losses

Cal Research's new treating process for cat crackers "builds" abrasion-resistant catalyst beads.

A new catalyst-treating process, said to halve catalyst losses in moving-bed catalytic crackers, is being licensed by California Research Corp., research subsidiary of Standard Oil Co. (Calif.).

The new process, which has been tested for more than a year in commercial operation, is reported by Cal Research to double catalyst life in such crackers without reducing its efficiency.

At present, eight plants, with capacities from 13,000 b/d to 25,000 b/d, are using the process. The amount of catalyst required in these plants has been reduced from 43% to 77%, according to A. L. Lyman, president of Cal Research.

Reduction in catalyst loss is through a chemical-physical process to reduce attrition of the moving catalyst beads.

Improvement of cohesion of the catalyst beads reduces the amount of fine particles circulating in the system, with many beneficial effects, Lyman said.

Benefits reported from the process are better reactor operation and, in some cases, increased capacity.

Examples cited by Lyman are: reduction in the solid particles discharged into the air from the flue stack and disengager stack; improvement in contacting efficiency in the reactor, regenerator, and stripper; reduction of solids content of fractionator bottoms; higher liquid recovery due to improved stripping of catalyst prior to regeneration; and reduction of the load on cyclone separators, which reduces erosion of this equipment.

Lyman also pointed out that many plants limited by coke burning rates can have capacity increased 5% to 10% with the Cal Research treating process—a result of faster catalyst circulation.

"When increased plant capacity is compared to the $300 to $400 per daily barrel of capacity for erecting new cracking plants, capital savings become obvious," Lyman said.

Catalyst savings for a typical airlift or bucket-type catalytic cracker are said to be well over $100,000 a year from a $5,000 installation.

For a 15,000 b/d moving-bed cracker, catalyst savings of from $135,000 to $250,000 a year are expected from the process, Lyman said. This compares to a complete installation cost of only about $5,000, including engineering, installation, and materials.

In most cases, installation is said to be possible without shutdown. Operating costs for materials are less than $5 a day per 100 tons of catalyst, and manpower requirements and utilities costs are negligible, Lyman reported.

Applicability of the catalyst-treating process is said to be broad, including all liquid-feed catalytic cracking units using extruded clay or bead catalyst, and conflow units with vapor feed.

The process is available under license from Cal Research.

What's New / IN PROCESSING

Aircraft Turbines Need Better Lubes

Lube oils for high-speed aircraft turbines of the future will have to be tailored to withstand greatly increased operating temperatures, says a U.S. Air Force scientist.

Mineral lubes, good at bulk temperatures to about 150F, and synthetic lubes for bulk temperatures up to 250F, are not adequate for coming high-speed aircraft.

Lubes to operate at 400F will be needed in the near future, with eventual needs of 600F and above, K. L. Berkey, of the U.S. Air Force's Wright Air Development Center, told the Aeronautic Meeting of the Society of Automotive Engineers this week, in New York City.

Major oil and chemical companies are working with the Air Force to develop "fluids" satisfactory at bulk operating temperatures of 400F.

Many materials, synthetics and silicones, are being screened by the Air Force lab. According to Berkey the lab is "getting close to our high-temperature (400F) lubricant." Major hurdles yet to pass are thermal and oxidative stability.

Further in the future is the need for turbine lubes to operate at bulk temperatures of 600F and above.

The 600F point, Berkey said, is the practical limit for conventional liquid circulating lubes. Beyond that temperature, work is being done to find other lubricating schemes for aircraft turbines.

Union Oil Co. of California will stop making certain asphalt products and lube oils at its Oleum (Calif.) refinery.

The products that will no longer be made are either low-volume or marginal-profit items. Other Union refineries, at Edmonds, Wash., and Los Angeles, will boost their output of these products.

•

El Paso Natural Gas Products Co. plans a natural gas liquids recovery plant at Opal, Wyo.

Capacity of the plant will be 250-million cu. ft. of gas a day. Products will be propane and natural gasoline. Cost of the plant will be $5-million, with completion due in early 1959 by Fluor Corp., Ltd.

•

Olin Mathieson Chemical Corp. has increased the capacity of its Beaumont (Tex.) sulfuric acid plant by 250%.

New capacity of the plant, which operates on raw materials from nearby refineries, is 500 tons a day.

•

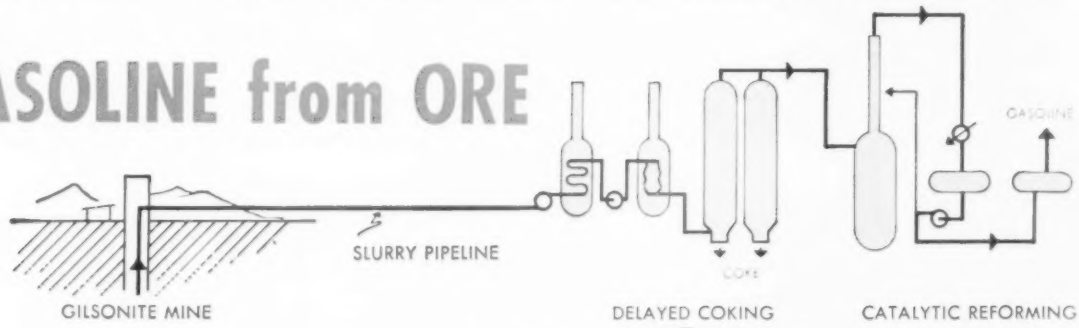
Shale oil is in the news again, with activity by the U.S. Government and British Petroleum Co.

A bill has been introduced in the Senate to transfer the Rifle (Colo.) experimental oil-shale facilities from the Bureau of Mines to the Navy.

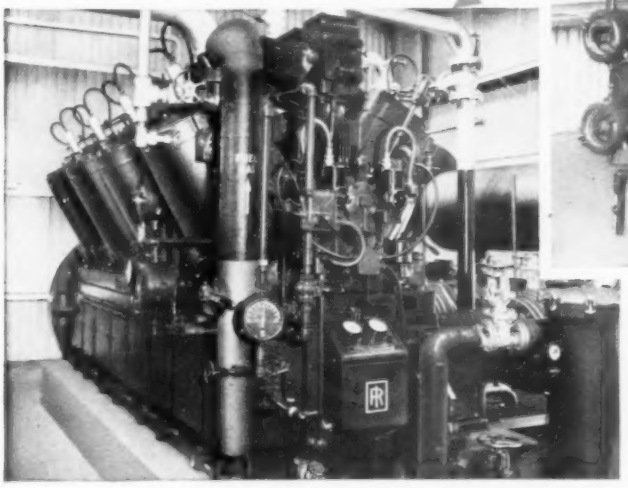
British Petroleum Co. is experi-

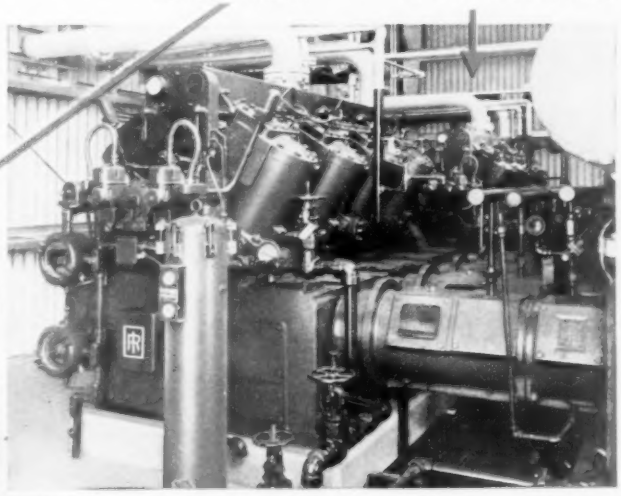
American Gilsonite's new refinery extracts

GASOLINE from ORE



Ingersoll-Rand SVG and JVG gas-engine compressors serve new process





Two Ingersoll-Rand 220-hp JVG-NL gas-engine compressors handling pure hydrogen for the catalytic reformer unit of the Gilsonite plant. The hydrogen is kept free from oil contamination by use of non-lubricated compressor cylinders with Ingersoll-Rand NL Channel Valves.

One of two Ingersoll-Rand 550-hp SVG 4-cycle gas-engine compressors handling hydrocarbon gas in the delayed coking section.

They're mining gasoline ore in Utah these days, and an old company in a new refinery is producing new products from it.

In addition to high-octane gasoline, the American Gilsonite Company* at Gilsonite, Colo., is producing high-purity electrode coke from this asphaltite ore. This ultra-modern coking and reforming plant is the nation's first to produce gasoline economically from a raw material other than crude oil, and it's doing it at the rate of 54,600 gallons a day!

Gas compression is required in both the delayed coking and catalytic reforming units, and since by-product hydrocarbon gases were available, Ingersoll-Rand gas-engine compressors were a natural selection for both jobs. The coke-producing unit, engineered by Foster Wheeler, uses two 550-hp SVG compressors; the refining unit, engineered by H. K. Ferguson, is served by two 220-hp JVG non-lubricated compressors.

In this new service as in all process plant applications, service-proved dependability and smooth operation over a wide range of speeds and loads make Ingersoll-Rand 4-cycle V-angle gas-engine compressors a profitable, long-term investment. Ask your I-R representative for more information about these and other types of equipment for petrochemical and process plants.

*An affiliate of Barber Oil Corp. and Standard Oil Co. of Calif.

Only [IR] compressors have CHANNEL VALVES

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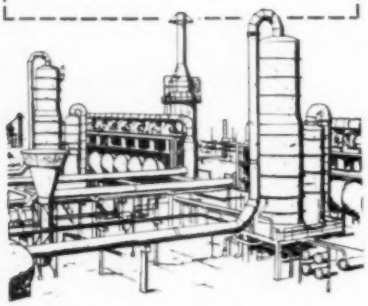

Texas Butadiene & Chemical Corporation
Houston, Texas

These Houdry Dehydrogenation Units have now been on stream one year, and their performance has exceeded the original projections.

They produce both butadiene and alkylate from normal butane . . . have a nominal combined design capacity of 86,000 ton/yr of butadiene—or 65,000 ton/yr of butadiene plus enough butene for 2.5 million barrels of alkylate.

The Houdry Dehydrogenation Process is the only commercial one-step process for transforming butane to butadiene or butene. Investigate it for maximum economy and flexibility.

*

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**Houdry means Progress . . . through Catalysis*

menting with in-place combustion to recover shale oil in Scotland.

•

Catalysts and Chemicals, Inc., of Louisville, Ky., has received a license from National Cylinder-Girdler to produce and sell catalysts identical to Girdler Co. catalysts.

Included in the arrangement would be Girdler's line of catalysts to produce synthesis gases, for hydrogeneration of petroleum and other compounds, desulfurization, deoxidation, and others.

•

Work is nearing completion on thermal cracking and crude distillation units at the La Libertad (Ecuador) refinery of Anglo-Ecuadorian Oilfields, Ltd.

Capacity of the cracker will be 6,000 b/d; of the crude unit, 7,700 b/d. Universal Oil Products Co. furnished process design, and Procon (Great Britain) Ltd. was chosen as the contractor for the engineering and construction of the project.

•

Pan American Petroleum Corp. is completing a gasoline-gas compression plant in the Cottonwood Creek area of Washakie County, Wyo.

Initial capacity of the plant will be 12-million cu. ft. a day of casinghead gas.

•

Cities Service Oil Co. has acquired the Stonewall County (Tex.) natural gasoline plant from Liquigas Co.

The plant, built in 1954, is producing about 75,000 gal. of natural gas liquids daily.

•

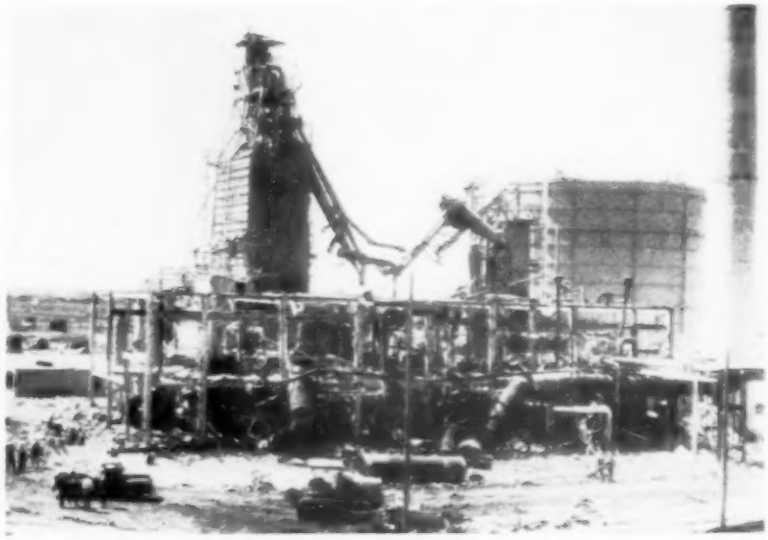
Japan's first Udex installation went on stream recently at the Kawasaki City (Japan) refinery of Mitsubishi Oil Co., Ltd.

The unit is designed to produce 750 b/d of benzene, toluene, and xylenes. Feedstock for the Udex unit comes from a recently-completed Platforming unit.

•

Du Pont plans a major expansion of product development and technical service facilities for TEL and other petroleum additives.

The new facilities will be housed in the two new wings to be added to the main lab building at Du Pont's Deepwater Point (N. J.) installation.



Texas City Chemical Blast Kills Three

A thunderous explosion at Union Carbide Chemical Co.'s Texas City (Tex.) petrochemicals plant killed three employees and wrecked a two-story brick building and a process tower. The blast was in the section of the plant where liquid oxygen is made.

The three casualties were in the control room, now the debris in the center of the photograph. Though the blast was felt for several miles, there were no casualties outside the immediate process area involved. Within 1¾ hours the rest of the plant was back in normal operation. According to company spokesman, product inventory is sufficient to ensure undelayed shipments.

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DEPT/Marketing

Group Insurance Takes a Toehold

Standard Oil Co. (Ohio) last week raised to nine the number of big oil companies that offer group insurance to their independent marketers (table). Sohio's new plan became effective Apr. 1.

Before the year is out, the total could possibly double. According to National Petroleum News, a McGraw-Hill publication, nine other big suppliers are showing considerable interest in helping jobbers, consignees, and dealers acquire insurance on their lives and health.

Gulf, Carter, Canadian Oil Companies, BP-Canada, and Shell of Canada are likely to begin programs in 1958. Giving the trend a close look are Socony, Esso Standard, Pure, and British American. In addition, the NPN survey shows that a third group of nine companies have group insurance "under consideration."

Big reason for the spread of such coverage: It helps draw capable manpower to a company's marketing operation. As Ed Stout, of General Petroleum Corp.'s insurance department, puts it, "Our primary purpose in offering the plan was to provide fringe benefits that would enable our distributors to compete with the larger industries in attracting high-caliber personnel."

Adds a Champlin Refining Co. executive, "We have something special we can offer prospective jobbers, agents, and dealers that other companies can't or don't."

Several majors hope their programs will reduce dealer turnover.

Four of the nine majors already active in group insurance pay part of the insurance premiums themselves. Ohio Oil Co., for example, pays 40% of the cost, with its consignees paying 60¢ per $1,000 of life insurance. Champlin is counting out $43,000 a year for its share of premiums. The company pays $6.95 monthly per person with dependent coverage—and $3.84 without. The charge to jobbers, consignees, and dealers is $5.15 a month with dependent coverage, and $2.40 without.

Five oil companies let the insurance companies run their programs. The suppliers may carry the administrative costs themselves, or include them in the premiums paid by marketers.

But regardless of company contributions, the group feature of the plan allows the marketers to pay rates lower than those they would have to pay on their own.

Some of the hospital-medical-surgical plans are competitive with local Blue Cross or trade association plans. Typical is a daily allowance for a hospital room, a maximum allowance for such costs as laboratory and operating room charges, allowances for surgical treatment, and allowances for medical treatment. Some plans include maternity benefits, allowances for medical treatment at home, and special allowances for diseases such as polio.

How Jobbers, Consignees, and Dealers Benefit

	Who may be insured (Figures show maximum straight life insurance)				What kind of coverage		
Company	Jobbers	Consignees	Dealers	Their employees	Dependents*	Life	Double indemnity—accidental death	Hospital, medical & surgical plan
Champlin	$3,500	$3,500	$3,500		x	x		x
Gen'l Pet.	$2,000	$2,000		$2,000	x	x	x	x
Ohio Oil[1]		$5,000		$5,000		x	x	
Phillips	$10,000					x		x
Shell	$10,000	$5,000	$5,000	$2,000		x	x	
Signal		$5,000		$2,500	x	x		x
Stand. (Calif.)		$5,000		$2,500	x	x		x
Stand. (Ind.)[2]	$4,000		$4,000	$1,000	x	x		x
Stand. (Ohio)		$5,000	$5,000	$2,500		x	x	

* Life insurance not available to dependents.
(1) Ohio Oil will soon extend coverage to jobbers and dealers.
(2) Indiana Standard will soon strengthen plan.

	How program is handled			
Company	Maximum monthly cost to insured[3]	Does supplier pay part?	Who administers	Insurance company
Champlin	$5.15	Yes	Insurance co.	New England Mutual
Gen'l Pet.	$14.22 employer; $13.24 employee	No	Gen'l Pet.	New York Life
Ohio Oil	60¢ per $1,000	Yes	Ohio Oil	Metropolitan Life
Phillips	Depends on claim experience	Yes	Phillips	General American
Shell	60¢ per $1,000	Yes[4]	Insurance co.	Travelers
Signal	$17.63 consignee; $12.75 employee	No	Insurance co.	Bankers Life
Stand. (Calif.)	$20.61 consignee; $15.64 employee	No	Insurance co.	Bankers Life
Stand. (Ind.)	$10.75 employer; $7.75 employee	No	Insurance co.	Metropolitan Life
Stand. (Ohio)	60¢ per $1,000	Yes	Sohio	Equitable

(3) Includes cost of hospital-surgical-medical plans, where offered; also includes coverage for dependents where allowed.
(4) Shell guarantees success of program at rates prescribed.
Source: National Petroleum News.

What's New / IN MARKETING

Consignment gasoline sales are getting a thorough test at stations on Long Island, N.Y. Four majors now have a fairly large number of outlets on a consignee basis, with at least some of the dealers operating on a 4½c-a-gal. commission for regular-grade gasoline.

The main spur to such arrangements has been price war conditions. The dealer gets a guaranteed minimum margin.

One major has now offered all its Long Island dealers a consignee status for gasoline. So far, 18 dealers have accepted it. The company expects they will be joined by 50 or 60 more.

•

Jersey Standard last week officially concluded purchase of the big service station operator, Gaseteria, Inc., which supplies some 300 outlets, mainly in Indiana and Illinois. The price: 108,500 shares of Jersey common stock, worth well above $5-million.

Gaseteria was actually purchased by Oklahoma Oil Co., which was recently acquired as a wholly owned subsidiary by Jersey. Said Ralph R. McCoy, Oklahoma Oil president, in acknowledging the deal, "The Jersey stock passed through my hands so quickly I hardly had time to get the feel of it."

McCoy and parent-company officials aren't talking much about their plans for Midwest operations. For example, they say they haven't decided whether or not to allow Gaseteria to keep its present brand name. Equally noncommittal is Gene Williams, Gaseteria president, who says, "I'm working for them now."

•

Sinclair Refining last week gained a jobber outlet for more than 5-million gal. of oil products in Ohio. The company reached an agreement with Champion Service Co., Hamilton, Ohio, under which Sinclair gains 22 station outlets, 19 commercial accounts, 3,000 heating oil customers, and 4 large farm routes. Champion will handle Sinclair brand products in its own stations and also supply Sinclair stations in the Hamilton-Oxford-Middletown (Ohio) area.

•

A check for $5 is the reward being offered field men of D-X Sunray's Northern division for each D-X credit card they pick up that is on the "do not honor" list. The main goal, according to Roy Ellis, the division manager at Waterloo, Iowa, is to get service station personnel to screen cards carefully.

Each month field personnel are being given a list of credit cards that have been lost, stolen, or otherwise discredited.

•

Tidewater Oil Co. added still more sales outlets in the East last week by buying a Cape Cod (Mass.) jobber. In acquiring Gould Oil Co., of Hyannis, Tidewater got 9 service stations, more than 75 dealer, commercial, and farm accounts, a product terminal, and an office building.

Formerly called the Cape Cod Oil Co., Gould Oil had been a Tidewater distributorship for 30 years. It will now be operated on a commission agent basis by E. W. Gould, Jr.

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DEPT / Personals

JAMES M. PATTERSON is the new director of public relations for American Oil Co., New York, succeeding **James S. Haskins**, who has resigned. Patterson has been a director of field services in the public relations department of the parent Standard Oil Co. (Ind.).

J. M. Patterson

H. H. Bible

H. HAROLD BIBLE, vice-president and assistant general manager of Lion Oil Co. division of Monsanto Chemical Co., El Dorado, Ark., has been elected general manager of Lion and vice-president of the parent company. At Monsanto's St. Louis (Mo.) headquarters, **E. J. Cunningham** is the new controller and director of the accounting department, after serving as assistant controller since 1931. Both **John L. Gillis** and **T. M. Martin**, vice-presidents and directors of the parent Monsanto, have been elected members of the executive committee.

WALTER M. SANFORD is the new assistant to **John Sidney Smith**, director of public relations for Sun Oil Co.'s production department, Dallas. Sanford, editor of the department's house magazine since 1954, will be succeeded by **Robert J. Wright**. **Victor T. Reynolds**, formerly with the public relations staff in Philadelphia, moves to Dallas as assistant editor, replacing Wright.

G. ALLAN NELSON has resigned from Colorado Oil & Gas Corp., to become a consulting petroleum geologist in Denver.

R. R. Kibbe

J. W. Green

RUSSELL R. KIBBE and **JOHN W. GREEN** have exchanged jobs as regional sales managers for The Texas Co. Kibbe takes over as manager of the 11-state southern sales region, in Houston, formerly Green's post. Green will manage the 14-state northern sales region, at New York City, formerly handled by Kibbe. This region also included the District of Columbia.

CLIVE RUNNELLS, JR., Houston oil man and rancher, and director of Henderson Drilling Co., has become president of the Liberty Income Fund, a mutual investment fund, in Houston.

JOHN E. ECKEL, Carter Oil Co., Tulsa, has been elected chairman of the Mid-Continent section of AIME's Society of Petroleum Engineers. Other new officers include **William E. Stiles**, Buffalo Oil Co., first vice-chairman; **Virgil Berry, Jr.**, Pan American Research, second vice-chairman; **H. Arthur Nedom**, Amerada Petroleum Corp., secretary, and **Ernest E. Finklea**, Schlumberger Well Surveying Corp., treasurer, all of Tulsa.

M. H. CLEMENTS has become pipeline superintendent of United Gas Pipe Line Co.'s Jackson (Miss.) district. He succeeds **Earl L. Wayne**, recently named assistant district manager. Clements has been district employee relations supervisor since 1947.

A. W. VITT has been named manager of exploration for Seaboard Oil Co.'s domestic producing division, in Dallas. Succeeding him as manager of the western area office, Denver, is **James F. McClung**, who continues to be responsible for land operations in the office.

IRVING LEIBSON will take over as technical specialist in the technical service division at Humble Oil & Refining Co.'s Baytown (Tex.) refinery. In Southwest Texas division at Corpus Christi, **H. C. Moran** has been advanced to safety engineer.

J. G. MIRANDA, secretary-treasurer of Michigan-Ohio Pipeline Corp., Mount Pleasant, has been named to the Oil Pipeline Advisory Committee on Valuation, Washington, D. C. This committee will replace the API engineers-accountants committee.

J. W. TONEY will head the new Charlotte (N. C.) sales office of Enjay Co., petrochemical marketing subsidiary of Standard Oil Co. (N. J.). With Toney will be **D. L. Duncan**, serving as technical representative.

ARNOLD YOUNG has joined Sunray Mid-Continent Oil Co., Tulsa, as staff writer, a new position created by the company for starting a new publication for D-X Sunray's West Tulsa refinery. Young was formerly news editor of the Cleveland (Okla.) American.

DONALD S. STRALEM is the newly elected 1958 president of the USO Fund of New York, Inc. He is a director of both Crown Central Petroleum and Atlantic Gulf Petroleum Corp., and a member of Crown Central's executive committee.

P. J. MERKUS succeeds **H. D. Dale** as manager of Shell Oil Co.'s Wood River (Ill.) refinery. Dale is retiring after 33 years' service. **G. C. Montgomery** moves up to manager of the Wilmington (Calif.) refinery, succeeding Merkus. Montgomery is being replaced as superintendent of the Wilmington refinery by **J. B. St. Clair**, who in turn, is succeeded by **E. A. Ballman** as assistant superintendent of the Martinez (Calif.) refinery. Ballman has been assistant manager of the Shellburn refinery of Shell's Canadian subsidiary, at Vancouver, B. C.

LOYD THOMPSON moves up to chief maintenance engineer of Continental Oil Co.'s headquarters manufacturing department, Ponca City, Okla. Thompson, formerly general maintenance engineer, succeeds **J. O. Thoen**, who has retired.

W. R. PEDEN has become vice-president of Southwestern Petroleum Co., Ft. Worth. Peden, with the firm 12 years, has served as purchasing agent, traffic manager, and, most recently, office manager.

PAUL M. CRANDALL has been advanced to comptroller of La Gloria Oil & Gas Co., Shreveport, La., succeeding **B. F. Harrison**. Crandall has been assistant comptroller since February, 1949.

P. M. Crandall

J. D. Clark

J. D. CLARK, of Beaumont, Tex., is moving to Cartagena, Colombia, as operating superintendent of Colombian Sun Oil Co. Others who are transferring are **Hardy Hines**, tool pusher, Morgan City, La.; **J. H. Boutotte**, drilling engineer, Eagan, La.; **Eugene Watson**, mud engineer, Conroe, Tex.; **M. R. Turner**, accountant, Dallas; **Gerald Loper**, purchasing agent, Beaumont. Three new members of the geological department in Bogota are **Dr. J. F. Harvey**, chief geologist, and **L. J. Davis**, geologist, both from Salt Lake City, and **E. C. Robinson**, geologist, Beaumont.

E. B. COLLINS has been promoted to assistant manager Shell Oil Co.'s New York head-office marketing accounting. He has been Ohio division treasury manager since 1947.

J. RONALD GETTY has taken a senior management post in Europe with Getty Oil Co., after resigning as administrative vice-president for marketing at Tidewater Oil Co., San Francisco. He will continue to serve as a director of Tidewater. Prior to his post in San Francisco, Getty was managing director in Germany of

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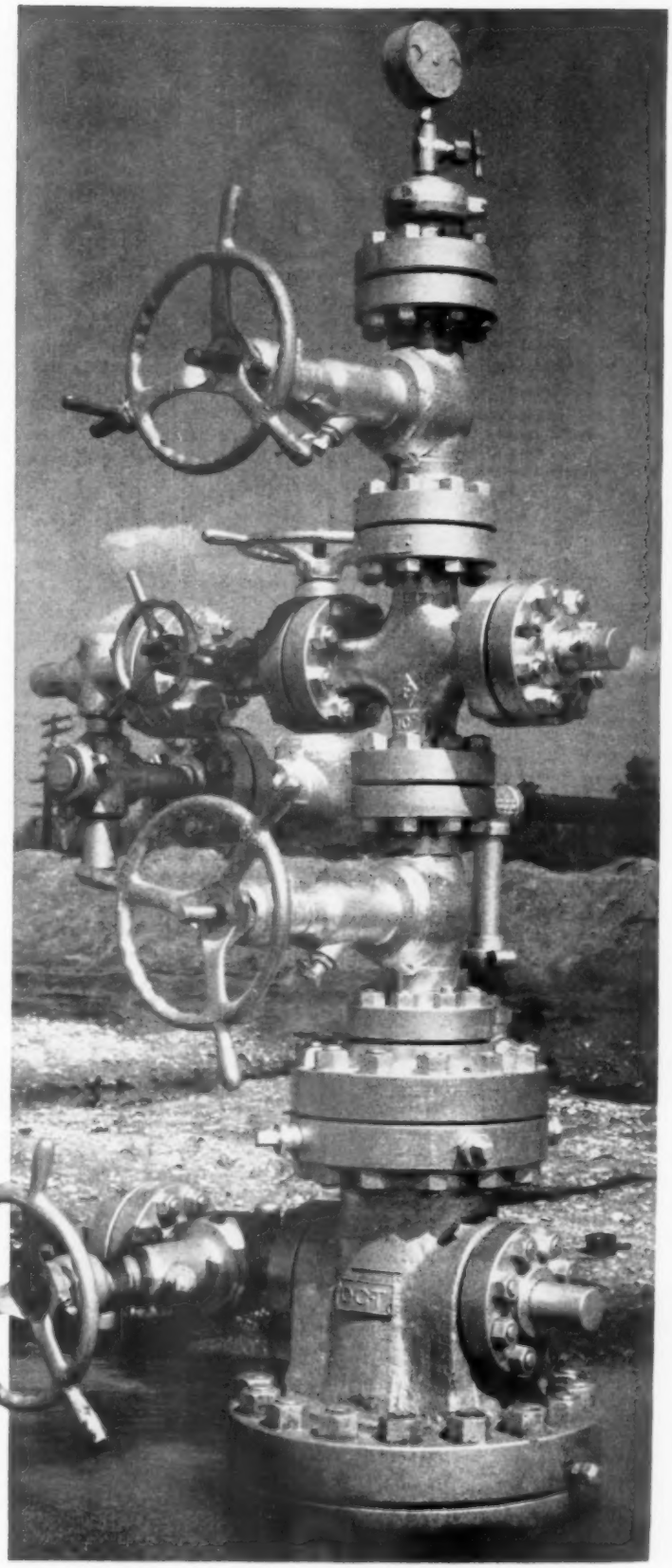

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WEST COAST REPRESENTATIVE: Fred P. Koenig Company, Long Beach, Calif., 3815 Atlantic Avenue, GArfield 4-3834

CANADIAN REPRESENTATIVE: T. R. Pickford & Company, Ltd., Calgary, Alberta, 536 8th Avenue West, Phone 2-7371

EXPORT REPRESENTATIVE: New York, 36, N. Y., 500 Fifth Avenue, BRyant 9-2236

City, formerly handled by Kibbe. This region also included the District of Columbia.

P. J. MERKUS succeeds **H. D. Dale** as manager of Shell Oil Co.'s Wood River (Ill.) refinery. Dale is retiring as a director of Tidewater. Prior to his post in San Francisco, Getty was managing director in Germany of

Veedol GmbH and Tidewater's export manager for Europe, Africa, and the Middle East. Getty Oil has tentative plans to build a refinery on the Rhine.

DR. ROBERT E. SCHILSON and **DR. ROBERT W. PARSONS,** research scientists, have joined the staff of Ohio Oil Co.'s research center near Denver. Both Schilson and Parsons received Ph.D.s in chemical engineering earlier this year. They will work in the engineering section of the center.

JOHN LAWSON, JR., transfers to Cochabamba, Bolivia, for Nance Exploration Co. He was formerly geophysical supervisor for the company, at Houston.

W. H. McPHAIL has moved up to area superintendent, at Drumright, Okla., for Tidewater Oil Co.'s central division production department. He succeeds **E. L. Layman,** who has retired after 32 years' service. **E. O. Smelser** and **T. C. Gibson,** senior field engineers at Odessa, Tex., and Hobbs, N. M., respectively, have been promoted to area engineers. Smelser succeeds McPhail at Drumright; Gibson takes over at Sallyards, Kan. In the Virginia district Tidewater has promoted three men in the Richmond area: **Rodman S. Lamorelle** has become service station planning supervisor; **Gordon E. Spooner,** former service station merchandiser, is the new district sales training supervisor; and **Wilbur Hammaker,** with the company since 1957 as real estate representative, will take over as acting area sales supervisor at Richmond, succeeding Lamorelle.

C. W. BUTLER is the new director of Gulf Research & Development Co.'s automotive engineering division, Harmarville, Pa., succeeding **J. E. Taylor.** Butler, with Gulf since 1933, most recently has been assistant to the director of the automotive engineering division.

WILLIAM E. McTURK is the new assistant director of Esso Research & Engineering Co.'s public relations division, Linden, N. J. McTurk, a chemical engineer, joined the public relations unit five years ago after five years with the products research division.

JOHN J. ALBRECHT has been made assistant chief engineer of gas engineering for The California Co., in New Orleans, succeeding the late **G. M. Liljenstein,** Since 1950, Albrecht has been division gas engineer for Calco at Natchez, Miss.

HUGH C. ELLIS is the new manager of General Petroleum Corp.'s marine department, succeeding the retiring **Lloyd J. Moore.** Ellis, administrative assistant since 1948, will make his headquarters in Fullerton, Calif.

H. D. WILSON has been promoted to assistant division manager of Sinclair Pipe Line Co.'s eastern products pipeline division, at Marion, Ohio. **D. S. Kauffman** replaces him as district superintendent of the Woodbury (N.J.) office. **N. E. Gustafson** has been made terminal foreman at Woodbury. Four newly appointed assistant district superintendents include: **R. L. Wells,** at Standish, Mo.; **F. W. Daugherty,** at Mechanicsburg, Pa.; **Virgil Oldham,** at Toledo, Ohio; and **John L. Rindosh,** at Mazon, Ill. **Eugene E. Kline** becomes senior engineer at Mazon.

E. J. McClanahan

H. G. Vesper

E. E. Wall

W. S. Morris

E. J. McCLANAHAN has been promoted to marketing director of Standard Oil Co. of California, San Francisco, and **H. G. Vesper** succeeds him as president of Standard Oil Co. of California, Western Operations, Inc. McClanahan will continue as board chairman of Western Operations, and as a vice-president and director of the parent Stancal. Vesper's former post as vice-president of marketing for Western Operations was recently taken over by **B. W. Pickard.** Succeeding Pickard as president of California Oil Co., Perth Amboy, N. J., Stancal's East Coast subsidiary, is **E. E. Wall. W. S. Morris,** former general sales manager at Caloil, becomes marketing vice-president, succeeding Wall.

MARVIN L. McCULLOUGH, Rivercrest Oil Co., has taken over on Apr. 1 as president of the North Texas Oil & Gas Assn., Wichita Falls, Tex. **David A. Kimball,** Alan Drilling Co., is the newly elected second vice-president. Reelected were **R. J. (Dick) Moran,** Moran Bros., first vice-president, and **George W. Anderson, Jr.,** attorney, executive vice-president.

G. S. MORRISON will manage the Toronto head-office lubricants department for Shell Oil Co. of Canada, Ltd. He was formerly district manager there. In the exploration and production division, **M. E. Falby** transfers to Edmonton as safety representative, from a similar post in the Calgary area office.

DeLYNN HEAPS is president of the newly organized Surety Oil Co., Vernal, Utah, which will operate in the Rocky Mountain area. Other officers include **Lowell Potter** and **Don Jenks,** vice-presidents, and **Leon Frazier,** secretary-treasurer. The company has properties in Montana and Wyoming.

E. C. WALTER has been promoted to assistant general manager of marketing in charge of development activities for Continental Oil Co., Houston. He was formerly director of retail marketing. **E. A. Williford** will continue as an assistant general manager of marketing in charge of administration activities. Also in Houston, **E. F. Shannon,** former manager of wholesale sales, will become manager of general office sales, which include all national account and wax sales.

WINSLOW F. GERRISH will manage the Elmira (N. Y.) marketing district for Socony Mobil Oil Co., succeeding **Raymond J. Hotaling, Jr.** Gerrish, with the company since 1937, has held various sales positions in the Socony offices in New England and New York.

TATE CLARK has transferred to Caracas, Venezuela, as chief geologist for Phillips Petroleum Co. He formerly was division manager for Phillip's land and geological department, in Amarillo, Tex.

CHARLES F. HEDGES has been named crude oil special representative by Western Crude Marketers, Inc., of Denver. He will handle crude oil activities in the Rocky Mountain region and Western Canada. Hedges was formerly employed by Clark Oil & Refining Corp., and The Texas Co.

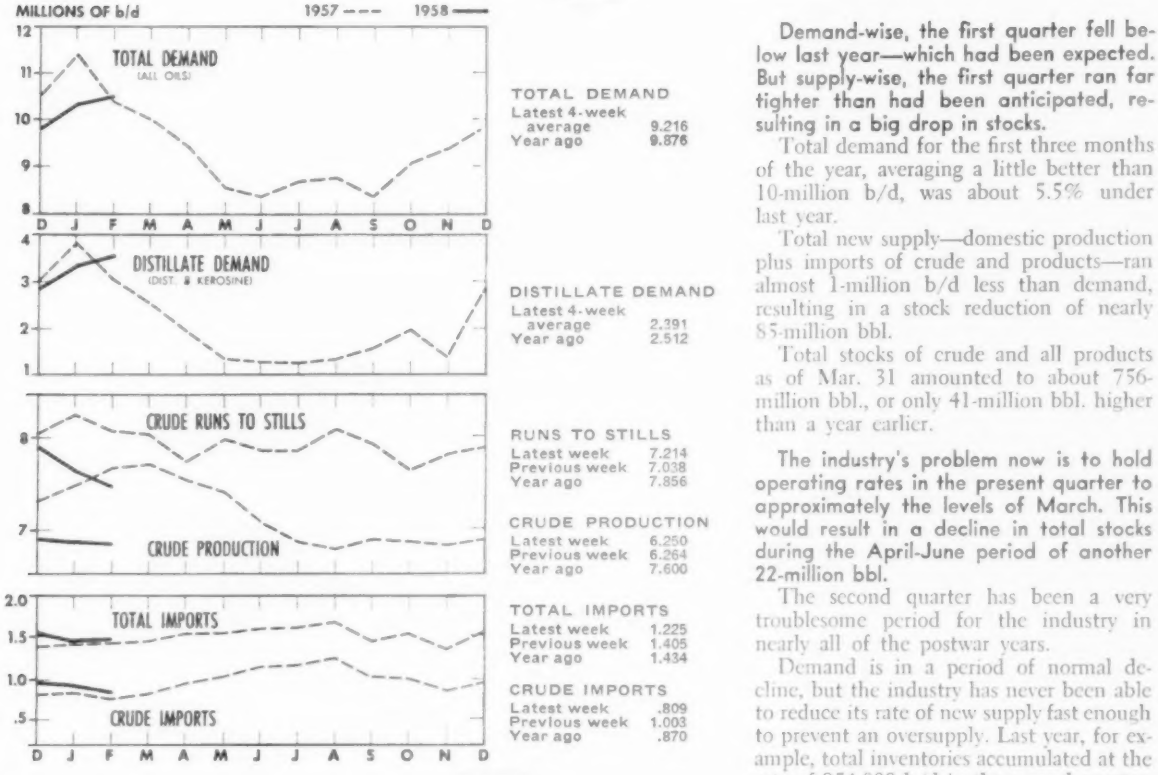
A. L. STEGNER has been made technical administrative assistant to the vice-president in the project development section of Tennessee Gas Transmission Co., Houston. **Leonard R. Brooks** transfers from process engineer for Bay Petroleum Corp., a TGT subsidiary, to the parent company, as chemical engineer. Stegner, with TGT since 1946, most recently has been corrosion and communications superintendent.

RUSSELL C. HOLCOMB has been appointed assistant manager of Sun Oil Co.'s New England region, with headquarters at Boston, succeeding the retiring **John M. Jasperson.** Since 1955, Holcomb has been the southeastern region retail sales manager, at Jacksonville, Fla. The appointment of two district office managers also has been made. **Edgar Kinsky** will take over the Columbus (Ohio) sales district, succeeding **Clarence W. Cocanougher,** who is retiring. Replacing Kinsky as office manager of the Brownsville (Pa.) district is **William J. Collier,** who transfers from a similar position in Williamsport, Pa.

W. T. BLACKBURN has been named state chairman of the Colorado Oil Information Committee. He is a partner in the independent oil producing firm of Vaughey, Vaughey & Blackburn, with offices in Denver and Jackson, Miss.

PETROLEUM WEEK'S

Fingertip Figures



TOTAL DEMAND

Latest 4-week average	9.216
Year ago	9.876

DISTILLATE DEMAND

Latest 4-week average	2.391
Year ago	2.512

RUNS TO STILLS

Latest week	7.214
Previous week	7.038
Year ago	7.856

CRUDE PRODUCTION

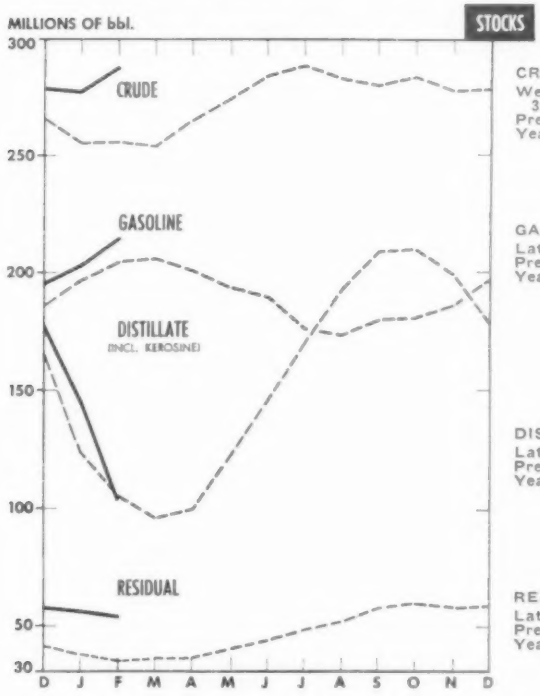
Latest week	6.250
Previous week	6.264
Year ago	7.600

TOTAL IMPORTS

Latest week	1.225
Previous week	1.405
Year ago	1.434

CRUDE IMPORTS

Latest week	.809
Previous week	1.003
Year ago	.870



CRUDE STOCKS

Week ended 3-29	285.6
Previous week	284.2
Year ago	254.9

GASOLINE

Latest week	214.7
Previous week	216.6
Year ago	203.3

DISTILLATES

Latest week	91.4
Previous week	92.3
Year ago	95.0

RESIDUAL

Latest week	54.7
Previous week	55.2
Year ago	37.6

Demand-wise, the first quarter fell below last year—which had been expected. But supply-wise, the first quarter ran far tighter than had been anticipated, resulting in a big drop in stocks.

Total demand for the first three months of the year, averaging a little better than 10-million b/d, was about 5.5% under last year.

Total new supply—domestic production plus imports of crude and products—ran almost 1-million b/d less than demand, resulting in a stock reduction of nearly 85-million bbl.

Total stocks of crude and all products as of Mar. 31 amounted to about 756-million bbl., or only 41-million bbl. higher than a year earlier.

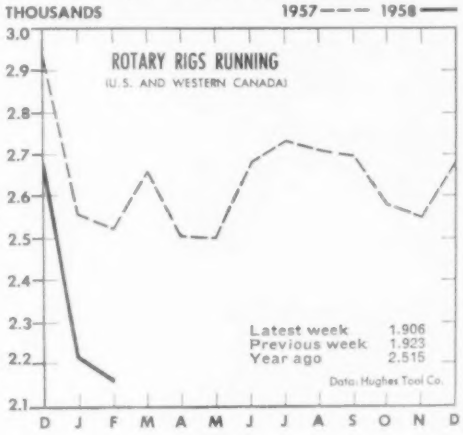
The industry's problem now is to hold operating rates in the present quarter to approximately the levels of March. This would result in a decline in total stocks during the April-June period of another 22-million bbl.

The second quarter has been a very troublesome period for the industry in nearly all of the postwar years.

Demand is in a period of normal decline, but the industry has never been able to reduce its rate of new supply fast enough to prevent an oversupply. Last year, for example, total inventories accumulated at the rate of 954,000 b/d in the second quarter, for a total build-up of 86.8-million bbl.

With the Suez emergency over, demand dropped off fast, but supply was permitted to remain high.

The oversupply created in the second quarter of 1957 is directly responsible for the industry's present economic troubles. And if the industry is to avoid further economic deterioration, supply must be held tight in the second quarter.


THOUSANDS
1957 --- 1958 —
ROTARY RIGS RUNNING
(U.S. AND WESTERN CANADA)
Latest week 1.906
Previous week 1.923
Year ago 2.515
Data: Hughes Tool Co.
D J F M A M J J A S O N D

as district superintendent of the Woodbury (N.J.) office. **N. E. Gus-**

newly organized Surety Oil Co., Vernal, Utah, which will operate in

& Blackburn, with offices in Denver and Jackson, Miss.

The Market Trend

Propane: Prices Weren't Supposed to Fall

This was the season propane prices were supposed to hold. Only recently a producer told PETROLEUM WEEK: "As far as I'm concerned, you can set type on those prices (LP-gas and natural gasoline) and print them all summer."

But last week, producers all through the Mid-Continent were lowering their quotations by a full 1¢, from 5¢ to 4¢. Prices in the Southwest were off as much as 1¢, too. Quotations eased 0.5¢ at New York.

The hard thing for the industry to swallow is that the propane price cuts came on the heels of an inventory decline that was little short of amazing. From mid-February to mid-March, stocks of propane at plants and terminals fell from 179.9-million gal to 89.2-million gal., a precipitous fall of 50.4%. As one producer put it, "Industry is working on bottom."

What irked many producers: Why cut the price when suppliers are still tight in many areas? A major cited a sustained run of sales that delayed his plans to start filling his underground storage. Even a jobber—a buyer—said, "It's goofy; I can't understand the move."

Some of the explanations for the drop didn't seem too convincing, either: "Buyers have come to expect lower prices in the summer"; "New Canadian production will cut into Mid-Continent markets soon"; "Upper Midwest roads are posted for weight limits, hindering propane deliveries." And so on.

Of course, the situation is made to order for the marketers with ample underground storage. At the lower price levels, a marketer can buy ten cheap cars, sell one, and store nine. By fall, he'll have a store of cheap product, which will be all set for an inventory appreciation—especially if producing-state crude allowables stay low.

Summing up, one irate producer said: "At these prices, the underground won't be filled by fall. We'll have tight supplies next winter."

Heavy Fuel vs. Coal:

Watch for intensified effort by oil companies to get utility business away from coal. This is a direct result of the imports-curtailment program on crude. For, to international oil companies, bunker oil is just crude oil in long pants.

Last week, a New York utility could get bunker "C" fuel as low as 35¢ off barge, delivered in cargoes. Steam plants all along the East Coast have an eye out for bargains.

Asphalt Oil Cuts:

Richmond Exploration Co. reduced its price for Boscan (Venz.) by 18¢, from $1.90 to $1.72. The cut in this 10-gravity asphalt crude follows earlier declines in other residual-bearing crudes in Lake Maracaibo.

West Coast Heavy Oil:

West Coast refiners hold nearly 30-million bbl. of residual, and need some buyers. East Coast terminal operators have a teetery barge price to put up with, and need some bargains.

California sellers don't want to tie sales prices to East Coast barge. East Coast buyers don't like the long time lag between f.o.b. purchases and delivery. Last week, a bid of $1.30 f.o.b. was turned down.

The Market Place / AROUND THE WORLD

Prices compiled for PETROLEUM WEEK by Platt's OILGRAM Price Service and National Petroleum News, McGraw-Hill Publications

All Prices as of April 7

Bold face type indicates changes from previous week

KEY PRICES—REFINED PRODUCTS

(¢ per gal. except dollars per bbl. where $ is shown)

Western Hemisphere

U. S. Gulf Coast, cargoes
- **Gasoline, 98 oct prem** ..... **12.125↓-14**
- **Gasoline, 92 oct reg** ..... **10.25↓-12.375**
- **Kerosine** ..... **8.625↓-8.875**
- Heating oil, No. 2 ..... 8.125-10.25
- Gas oil, 48-52 d.i. 8.375-10.5
- Fuel oil, bunker "C" $2.25

Caribbean, cargoes
- Avgas, Grade 100/130 ..... 16.5
- Gasoline, 93 oct research prem 10.75
- Gasoline, 87 oct research reg 9.875
- Gasoline, 79 oct research 9.125
- Gasoline, 70-72 oct motor method 9
- Kerosine 9.125
- Heating oil, No. 2 ..... 8.125
- Gas oil, 48-52 d.i. 8.375
- Fuel oil, bunker "C" $2.25

New York Harbor, barges
- Kerosine 9.35
- Heating oil, No. 2 ..... 8.85
- Fuel oil, No. 6 ..... $2.65

Okla-Group 3, northern shpt, bulk
- Gasoline, 89 oct reg 11.25-12.25
- Kerosine 9.5-10
- Heating oil, No. 2 ..... 8.5-8.75
- Fuel oil, No. 6 ..... $1.20-1.50

Chicago, bulk
- Gasoline, 91 oct reg 11.75-12.8
- Heating oil, No. 2 ..... 9-10.3
- Fuel oil, No. 6 high sulfur 6.65-6.75

Los Angeles, rack
- Gasoline, 88 oct reg 11.9-13.6
- Diesel fuel, PS 200 ..... 10-11.25
- Light fuel, PS 300 ..... $3.25-3.65
- Heavy fuel, PS 400 ..... $2.70-3.05

Natural Gasoline, Grade 26-70
- FOB Group 3 ..... 4.5
- FOB Breckenridge, Tex. 4

LP-Gas
- **Propane, Oklahoma (Group 3)** ..... **4.5*↓**

Penna Lubes
- Bright stock, 25 p.t. 26-27
- 200 vis. neutral, 25 p.t. 24-25

Mid-Continent Lubes, Tulsa basis
- Bright stock, solvent, 95 v.i. 23-26.5
- Neutral, solvent, 200-210 vis. 19.5-22.25

Gulf Coast Lubes
- Bright stock, solvent, 95 v.i. 24-26.5
- Neutral, solvent, 200 vis. 20.5-23

*Effective April 2.

Eastern Hemisphere

Singapore (Pulau Bukom), cargoes
- Avgas, grade 100/130 ..... 17.5
- Gasoline, 79 oct research 9.875
- Kerosine 10.125
- Gas oil, 48 d. i. minimum 10

KEY PRICES—CRUDE OIL

(2¢ differential per deg. of grav. applies except as noted)

Western Hemisphere

United States (at the well)
- Mid-Continent, 36.0-36.9 ..... 2.83-3.07
- North Dakota, 36.0-36.9 ..... 3.07
- Texas:
  - Gulf Coast, low cold test, 26.0-26.9 ..... 3.50
  - Gulf Coast, Upper & Lower, 26.0-26.9 ..... 3.07-3.22
  - West Texas, sweet, 36.0-36.9 ..... 3.00-3.07
  - West Texas, N. M., inter., 36.0-36.9 ..... 3.00
  - West Texas, N. M., sour, 32.0-32.9 ..... 2.86
  - East Texas, flat 3.25
  - Mirando, 28.0-28.9 ..... 3.31
- **Illinois Basin, flat** ..... **3.00↓**
- Pennsylvania Grade, Bradford dist., flat 4.40
- California, Signal Hill, 21.0-21.9 ..... 2.93‡
- North Louisiana-Arkansas, 36.0-36.9 ..... 2.92-3.02
- Wyoming sweet, 36.0-36.9 ..... 3.00
- Wyoming sour, 32.0-32.9 ..... 2.71

Canada (flat prices, at the well)
- Acheson-Stony Plain (Alta.) 2.68
- Leduc-Woodbend (Alta.) 2.74
- Redwater (Alta.) 2.63
- Daly (Man.) 2.46
- Smiley (Sask.) 2.40

Venezuela (Cargoes, FOB lifting port designated)
- Cumarebo, 48.0-48.9, Tucupido 3.75
- San Joaquin, 41.0-41.9, Puerto la Cruz 3.34
- Oficina, 35.0-35.9, Puerto la Cruz 3.05
- Tia Juana, Medium, 26.0-26.9, Amuay 2.55
- Bachaquero, flat, Amuay, Las Piedras 2.03-2.23
- Tarra, 38.0-38.9, San Lorenzo 3.08
- Lagunillas Heavy, flat, Amuay, Cardon 2.25-2.38

‡Differential per deg. of grav. varies.

Eastern Hemisphere

Middle East, Persian Gulf (Cargoes, FOB lifting port)
- Arabia, 34.0-34.9, Ras Tanura 2.08
- Safaniya, 27.0-27.9, Ras Tanura 1.79
- Iran, 34.0-34.9, Bandar Mashur 2.04
- Iran, 34.0-34.9, Abadan 1.90
- Iraq, 35.0-35.9, Fao 1.98
- Kuwait, 31.0-31.9, Mina al-Ahmadi 1.85
- Qatar, 41.0-41.9, Umm Said 2.23

Middle East, Eastern Mediterranean
- Arabian, 36.0-36.9, Sidon 2.49
- Iraq, 36.0-36.9, Tripoli, Banias 2.49

Far East, Cargoes, FOB Lutong, Sarawak
- Seria Light, 37-38 ..... 2.75

KEY TANKER RATES

(Last paid, per long ton, single voyage)

- **U.S. Gulf-New York, clean (USMC —35%) $1.85↓**
- U.S. Gulf-New York, dirty ..... (USMC —32½%) $1.92
- **NWI-USNH, dirty** ..... **(USMC —60%) $1.08↓**
- **NWI-UK/Cont., dirty** ..... **(Scale —57½%) 13/10↓**
- Persian Gulf-UK Cont., dirty ..... (Scale —50%) 50/-
- Persian Gulf-USNH, dirty ..... (USMC —62½%) $4.76

*Sterling.

delivery. Last week, a bid of $1.30 f.o.b. was turned down.

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PROFESSIONAL SERVICES 75

CLASSIFIED ADVERTISING
F. J. Eberle, Business Mgr.

BUSINESS OPPORTUNITIES 75

PETROLEUM WEEK REPRESENTATIVES

Atlanta 3 — Douglas C. Billian
1301 Rhodes-Haverty Bldg.
Jackson 3-6951

Boston 6 — Edward A. Callahan, Jr.
350 Park Square Bldg.
Hubbard 2-7160

Chicago 11 — W. F. Holbrook
520 North Michigan Avenue
Mohawk 4-5800

Cleveland 15 — J. E. MacArthur
1164 Illuminating Bldg.
55 Public Square
Superior 1-7000

Denver 2 — J. W. Patten
Mile High Center, 1740 Broadway
Alpine 5-2981

Houston 25 — D. O. Hanson
724 Prudential Bldg.
Jackson 6-1281

Los Angeles 17 — Peter S. Carberry
1125 W. Sixth St.
Madison 6-9351

New York 36 — Edward A. Callahan, Jr.
Donald R. Thompson
500 Fifth Ave.
Oxford 5-5959

Philadelphia 3 — W. A. Potter
6 Penn Center Plaza
Rittenhouse 6-0670

San Francisco 4 — William C. Woolston
68 Post Street
Douglas 2-4600

Tulsa 3 — J. A. Hartley
909 Enterprise Bldg.
522 South Boston
Gibson 7-5594

England, London E. C. 4 — Herbert Lagler
McGraw-Hill Co., Ltd.
95 Farrington St.

DEPT/Service & Equipment Companies

EDWARD Z. WALDEN has become export sales representative in New York City for National Lead Co.'s Baroid division. He will also serve as sales engineer for Baroid Chemicals, Inc., in the New York district. Walden spent four years with Mellon Institute, in Pittsburgh, on a fundamental study of starch chemistry.

E. Z. Walden

O. P. Carter

O. P. CARTER is the new president of Midwest Piping Co., St. Louis, succeeding **Eric A. Kerbey.** Carter was formerly executive vice-president of the firm, which is a fabricator and erector of power plant and industrial piping systems.

JOHN G. SIBLEY will take over the newly created post of southern regional manager for Jefferson Chemical Co., at Houston. He was formerly district sales manager in Charlotte, N. C. **William P. Thorp III,** a recent graduate, has been assigned to the Charlotte office as resident salesman.

H. P. WICKHAM has been appointed manager of M. W. Kellogg Co.'s newly formed project engineering department, New York. He was formerly manager of the operating division's process department.

T. B. PETERSON will manage San Francisco district sales for Duff-Norton Co., Pittsburgh manufacturer of industrial lifting jacks and hoists. Peterson has been with the company since 1952, most recently in the San Francisco district sales office.

CHARLES B. COX transfers to Paris as supervisor and general manager of General Geophysical Co. de France. He most recently was supervisor of seismic operations in the Rocky Mountains and Canada for the parent company.

RICHARD J. BAUER, regional manager of the oil field division of Gardner-Denver Co., has been elected a vice-president of the firm. Bauer, who has been with the company since June, 1923, will continue to make his headquarters in Dallas.

P. A. WAGSTAFF is to be manager of the newly organized Kansas division of Welex, Inc., in Wichita. Other division personnel include **W. B. Clark,** assistant manager; **Jack Wheeler,** sales manager; and **R. H. Mallett, Jr.,** sales engineer. This division includes districts in Great Bend, Hays, Pratt, and Winfield, Kan., and Crossville and Salem, Ill. Welex has opened a new operating base for oil well service at Harvey, La. **Dean W. Kelley** heads the wireline service operations here, and **Karl Carlson** is manager of barge units for inshore work. Four field operating engineers are **Charles W. Tipps, Doyle J. Prince, J. L. Everett,** and **Ned A. Miller.**

JOHN R. ASTON will manage a new Continental-Emsco supply store in Maracaibo, Venezuela. Operating in Venezuela as Continental-Emsco Co. C. A., the firm now has three stores and offices there.

C. E. SAMPLE has been promoted to salesman in Wichita Falls, Tex., for Jones & Laughlin Supply Division. He is succeeded as Casper (Wyo.) store manager by **G. R. Kennedy,** who is replaced in a similar post at Chase, Kan., by **W. J. Doerfler. S. D. Martin,** a salesman at Estevan, Sask., transfers to Calgary, Alta.

T. J. BREWER, who heads a Houston firm bearing his name, has been appointed manufacturer representative for Western Chemical Co., Kansas City, Mo. Western develops and produces water-treatment chemicals and provides engineering services pertaining to that field. Brewer was associated with Humble Oil & Refining Co. for 30 years, before resigning last year to establish the present business.

THEODORE F. COCKS will manage the new district sales office at Kansas City, Mo., for Chicago Bridge & Iron Co. He was a member of the Chicago district sales office prior to moving to Kansas City.

CHARLES J. HOLCOMB has been appointed senior field engineer and **H. WILSON WERHAN** has been named field engineer, in the Newark (N. J.) office of Chiksan Co., Brea, Calif., manufacturer of ball-bearing swivel joints and swivel jointed assemblies. Holcomb transferred to Chiksan from its Well Equipment Mfg. Corp. division, with which he had been associated for nine years. Werhan was formerly with the service department of Curtiss-Wright's Wright Aeronautical division.

EDMUND R. LEHMANN has been named manager of application engineering for the industrial controls division of Manning, Maxwell & Moore, Inc., Stratford, Conn. He was previously with Fischer & Porter (Canada) Ltd., and McColl-Frontenac Oil Co.

CONRAD P. LOZANO, FRANK J. ORTT, JAMES H. ROBERSON, JR., and **ROBERT E. MORGAN** are recent additions to the field engineer staff of Tretolite Co., division of Petrolite Corp. Lozano, formerly warehouse manager of Tretolite's stock location and laboratory facilities in Odessa, Tex., will remain there as field engineer. Ortt, who was with Sun Oil Co. in Alberta, becomes a Tretolite representative at Este-

Gas oil, 48 d. t. minimum.....10

*Sterling.

van, Saskatchewan. Roberson, formerly with Kobe, Inc., at Brownfield, Tex., has been assigned to the Casper (Wyo.) district. Morgan enters the San Antonio (Tex.) district, after service with Houston Oil Field Material Co. **Lester O. Eime** and **Roy W. Greenlee** have joined Petrolite as research chemists. Eime, formerly research chemist for Alcoa Research Laboratories, East St. Louis, Ill., will be located in Petrolite's laboratory in Webster Groves, Mo. Greenlee joins the firm in its St. Louis laboratory, after service with the organic chemistry division of Battelle Memorial Institute.

JOSEPH D. PROBST has joined Chek-Chart Corp., Chicago, as an account executive. He formerly held a similar position with Henri, Hurst & McDonald, Chicago advertising agency.

J. W. (Bill) BREEDEN has been appointed Dallas district sales manager for United States Steel Corp.'s American Steel & Wire division. Formerly wire rope salesman at Odessa, Tex., Breeden succeeds **B. M. Ashbaucher,** who has been named district sales manager at Chicago.

M. M. Watkins J. C. Koch

M. MARK WATKINS has become president, and **JOHN C. KOCH** executive vice-president, of Conoflow Corp., manufacturer of control valves, actuators, and air regulation devices. Watkins succeeds the retiring **R. B. Werey;** Koch, former vice-president and general manager, replaces Watkins.

GEORGE THORN has been appointed to the industrial sales division, at Houston, by Standard-Southern Corp., supplier of oilfield, refinery, industrial, and petrochemical construction materials.

DICK M. KOONS has joined Otis Engineering Corp., in Dallas, as a development engineer. He was formerly senior production engineer for Cia. Shell de Venezuela, in Maracaibo.

F. W. KAYSER is the new merchandise manager for the industrial products divisions of Hewitt-Robins, Inc., with headquarters in Stamford, Conn. He has managed the Boston sales district since 1956.

De FRANCE CLARKE will manage the new projects department of Union Carbide Chemicals Co., a division of Union Carbide Corp., New York. This is a new department, established to find and develop new programs within the marketing organization.

A. I. THOMPSON has been appointed vice-president in charge of sales for Barton Instrument Corp., Monterey Park, Calif. He was formerly vice-president and sales manager.

A. I. Thompson K. C. Wizeman

KARL C. WIZEMAN has been named product manager of the metal packing line for Garlock Packing Co., Palmyra, N. Y. He has been staff superintendent of the metal division since April, 1957.

J. O. (Bill) REDMON and **HOYT JOHNSON** will share supervision of Houston Oil Field Material Co.'s new Pampa (Tex.) store. Others assigned to the new location are **Lowell M. Ebeling** and **William C. Heard,** fishing tool supervisors; **Carey L. Duff,** warehouse manager; **Edward F. Galvin,** electrical well service supervisor; and **Walter H. Nolen,** electrical well service rigger.

HENRY LIPKIND, with L. Sonneborn Sons, Inc., since 1946, has been appointed chief chemist of the company's Belleville (N. J.) plant. He will be in charge of technical and research activities of Sonneborn's building products and Whistlelean divisions.

R. F. FRED KLEIN has been appointed manager of lubricated plug valve sales for Walworth Co., New York valve and pipe-fitting manufacturer. He formerly was a sales engineer in the company's metropolitan division, where he specialized in sales to the gas distribution industry.

ROBERT M. SACHERE has been appointed a senior process engineer in Blaw-Knox Co.'s chemical plants division, Pittsburgh. He will specialize in the design and construction services offered to the petroleum and petrochemical industries. Sachere's most recent positions include eight years in project engineering with Arthur G. McKee & Co., Cleveland, and three years in project and process engineering with Wyandotte Chemicals Corp., Wyandotte, Mich.

RICHARD W. EDDY will manage the new chemicals division of Union Carbide Chemicals Co., a division of Union Carbide Corp., New York. He has been assistant manager of this department since 1955.

LAWRENCE LOWY heads John-Lawrence Associates, New York, a new engineering consultant firm established to serve the petroleum and petrochemical industries. Lowy was formerly eastern regional manager of petroleum sales for Proportioneers, Inc., a division of B-I-F Industries, Inc. The organization will concentrate on the handling of products at both the manufacturing and marketing levels.

D. L. WHATLEY has been appointed city representative at Wichita Falls, Tex., for U.S. Steel's Oil Well Supply Division. Whatley, with the company since 1948, most recently has been manager of the Gainesville (Tex.) store.

C. DON CHAMBLIN has been elected a director of Bradford Supply Co., Bradford, Pa. He joined the company 35 years ago in the pipe yard at Robinson, Ill., and has worked successively as store manager and district manager, his present post.

DR. IRA KUKIN is the new research director at the Belleville (N. J.) plant of L. Sonneborn Sons, Inc. He will be in charge of research and development of petroleum textile products for the company, petroleum refiners and manufacturing chemists. Kukin has been with Sonneborn since 1957 as liaison chemist in the industrial research department.

DR. THEODORE M. VIAL will manage the rubber chemicals department's technical service for the organic chemicals division of American Cyanamid Co., in Bound Brook, N. J. Vial, with the company since 1950, has held supervisory positions in the new product development department since 1954.

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AS THE EDITORS SEE IT

Do Producers Want Federal Control?

THE "PRODUCERS' BILL" TO CONTROL IMPORTS could backfire on its sponsors. The bill, introduced in Congress by Rep. Frank Ikard (D., Tex.), reflects producer thinking.

The mechanics of the plan drafted by the producer groups, which creates a base from which a proper volume of imports can be established, has some merit. In fact, the formula for determining imports is much closer to reality than the quotas provided in any of the previous voluntary plans. Too, the plan includes products imports.

The bill introduced by Rep. Ikard would limit the volume of crude and products imports to 16.6% of domestic crude production. The Bureau of Mines would estimate domestic production for a calendar year, and the estimate would be revised quarterly.

The plan is flexible in that, to prevent an undersupply or an oversupply, underages and overages in a particular quarter would be corrected by revisions in the permissible imports in the next quarter. And, of the total imports to be permitted under the ratio, prospective importers would bid for quotas, with the quotas to be awarded to the highest bidder.

The government would receive the proceeds from the winning bids. The amount of the bids would, of course, reduce some of the disparity between the landed cost of foreign crude and domestic oils.

All of those provisions are to the advantage of producers. But the obvious disadvantage in such a bill doesn't make it worthwhile.

THE BILL IS BAD FOR THE OIL INDUSTRY. For, in proposing it, domestic producers are asking for federal regulation. Some may argue that passage of the bill would only mean federal control of imported oil. But over the long haul, there is no such thing as a little bit of federal regulation.

Some of the same producer groups that are backing the bill strongly oppose the "little bit of federal regulation" that is now imposed on them under the Federal Power Commission's administration of sales of natural gas by producers to pipeline companies. The producers have argued that federal regulation of natural gas will lead to federal regulation of oil.

Similarly, PETROLEUM WEEK believes, the Ikard bill would be just one more step towards federal regulation of oil. The Bureau of Mines presently makes estimates of crude production on an annual as well as a monthly basis as a service to the industry.

But under the imports bill, the bureau's estimates of production would take on a new meaning. The bureau's estimates could become an order, telling each state just how much oil to produce.

ONE OTHER DANGER in the bill is that it could easily place the control of imports in the hands of the international companies. With substantial foreign production, these companies could outbid smaller importers for the available quotas.

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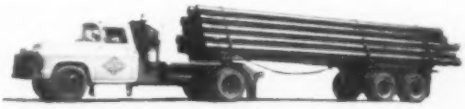

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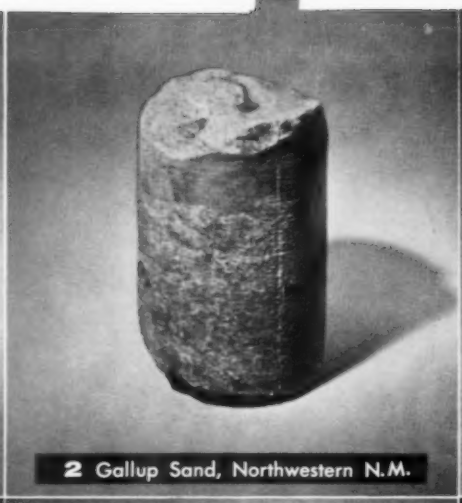
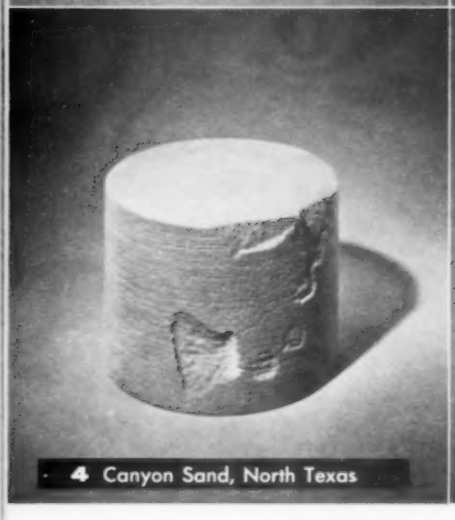
1 Clear Fork Lime, West Texas



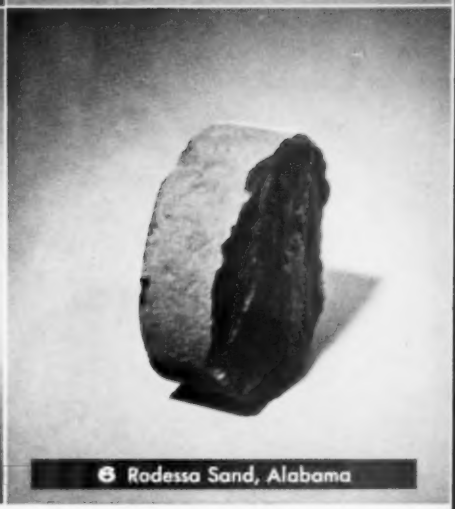
2 Gallup Sand, Northwestern N.M.

3 Triassic "D", British Columbia



4 Canyon Sand, North Texas

5 Wilcox Sand, South Texas



6 Rodessa Sand, Alabama

Dowell Guide To Fracturing

1 **Clear Fork Lime, West Texas:** This limestone contains varying amounts of dolomite and salt. Duofrac* has been quite successful — using large volumes of weak acid as a sand carrier. This fluid attacks both the formation and salt crystals. 50,000-gallon treatments, injection rates up to 50 bpm and ball sealers, are common. After treatment, some wells potential over 300 bopd.

2 **Gallup Sand, Northwestern New Mexico:** This core is from one of the better Bisti wells. Permeability is often less than one millidarcy and porosity ranges from zero to 12 per cent. Before treatment, wells often will not produce commercially. After a 500-gallon spearhead of Mud Acid, followed by Sandfrac* — using 50,000 gallons of lease crude and 50,000 pounds of sand at 30 to 40 bpm — many wells potential up to 600 bopd.

3 **Triassic "D", British Columbia:** This sandstone gas pay frequently produces commercially before fracturing. However, many operators have increased potentials by fracturing with Sandfrac*, using diesel oil with 100 pounds of FLA (Fluid Loss Agent) per 1,000 gallons. Treatments usually consist of 20,000 gallons fluid and 20,000 pounds sand down tubing at about 8 bpm. Results vary widely — with increases from two to 25 mmcfd being reported.

4 **Canyon Sand, North Texas:** Wells completed in this Pennsylvanian age formation often give high initial production (80 to 300 bopd). However, a steep decline curve to 8 or 10 bopd in six to nine months makes fracturing advisable. Usual treatment is a spearhead of 500 to 1,000 gallons of a special acid followed by Sandfrac* — using 10,000 to 20,000 gallons lease crude and 1½ pounds sand per gallon. FLA* (Fluid Loss Additive) is often used. Treatment generally increases production and reduces decline rate.

5 **Wilcox Sand, South Texas:** This shale-streaked sandstone is found from 8,000 to 11,000 feet. Bottom-hole temperature is high — from 225° to 300°F — and pay zones range from 15 to 200 feet in thickness. Stratafrac* is often used because it is designed to clean up fast and suspends sand well at high temperatures. Treatments range from 6,000 to 12,000 gallons injected at 3 to 5 bpm, with 1 pound of sand per gallon. Production frequently increases from less than 10 to 70 bopd through choke.

6 **Rodessa Sand, Alabama:** The Citronelle Field produces from two sections of dirty sand varying in depth from 10,400 to 11,600 feet. Super Mud Acid, with an added silicate control agent, is used to dissolve and shrink clays. Petrojel*, using 20,000 to 30,000 gallons jelled crude with 20,000 to 40,000 pounds sand is usually recommended. Ball sealers are frequently used to spread the effect of the treatment. Many wells then potential over 300 bopd.

With nine basic fracturing treatments and many variations of each, Dowell engineers can help you "tailor" treatments to the requirements of your job. Results have shown quick payouts, slow decline rates, few workovers, and excellent ultimate recoveries. Dowell Incorporated, Tulsa 1, Oklahoma.

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